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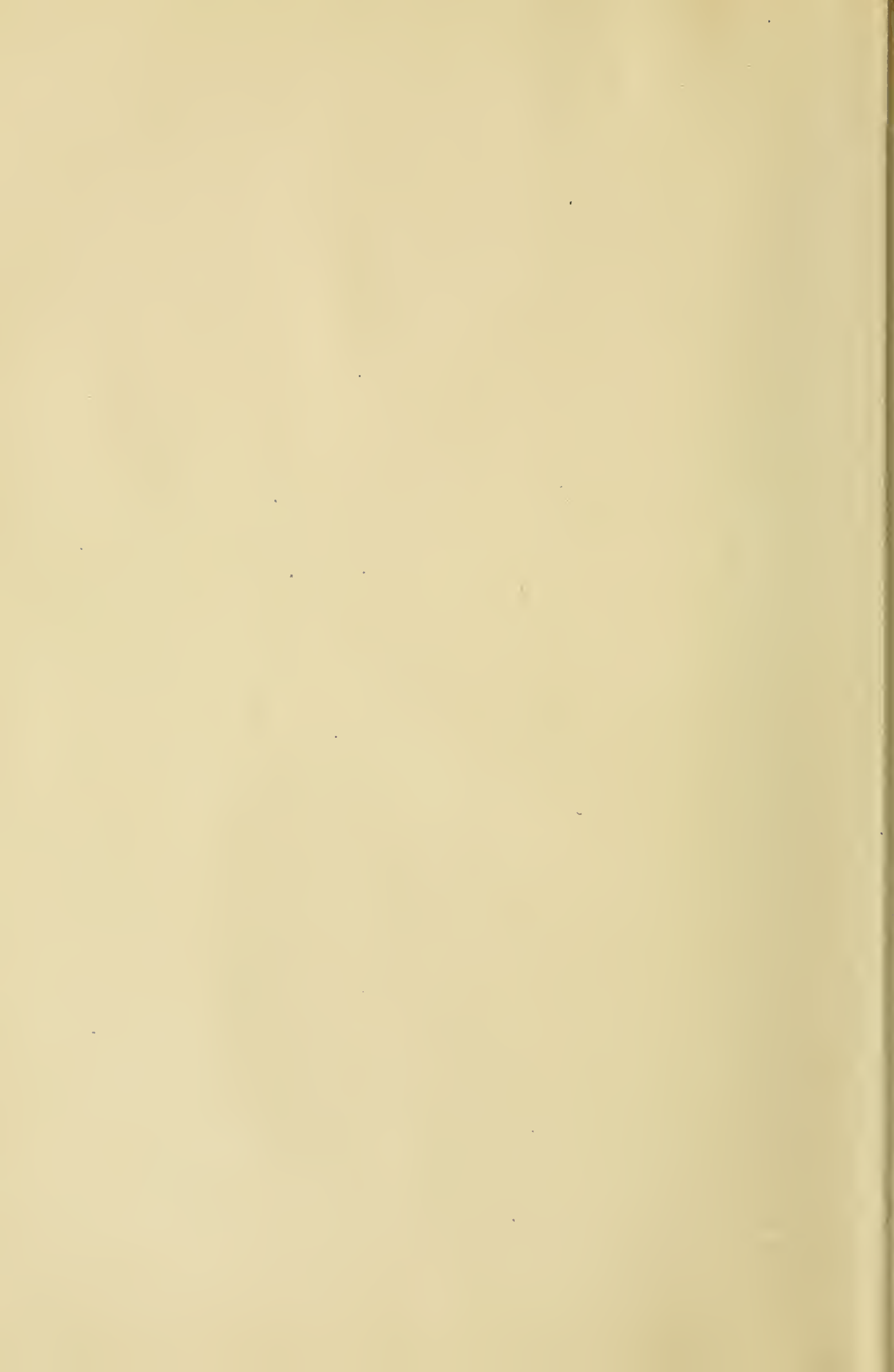
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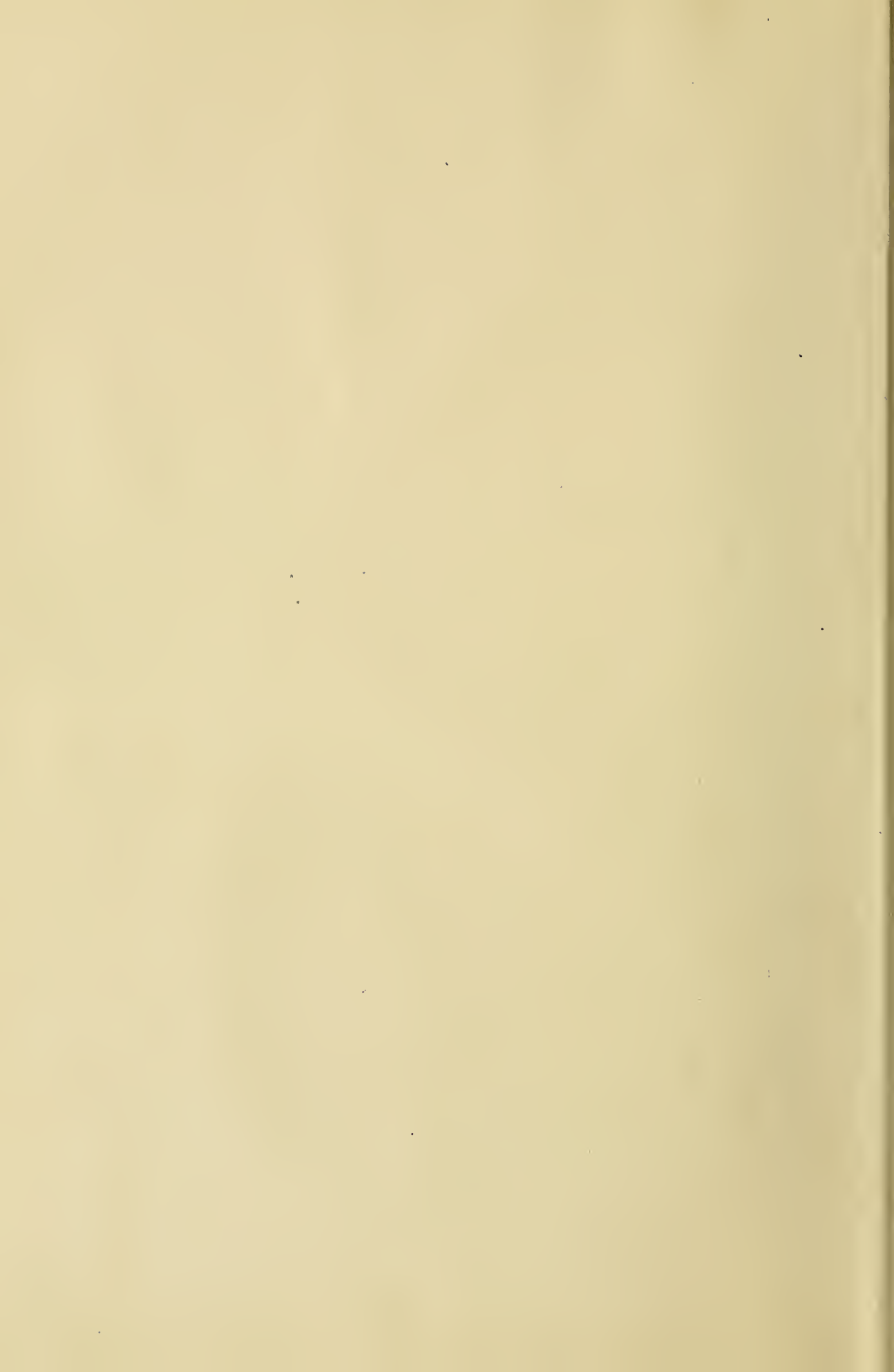












# THE EXPERT SIGN PAINTER

SECOND EDITION

A MANUAL OF INSTRUCTION FOR THE BEGINNER AND A HANDBOOK FOR THE PRACTICAL LETTERER OR SIGN PAINTER.

GIVING THE METHODS OF THE MOST EXPERT SIGN ARTISTS, WITH PLATES OF ALL THE PRINCIPAL ALPHABETS USED, WITH MANY OTHER ILLUSTRATIONS; THE FORMER WORK REVISED AND ENLARGED, WITH MUCH NEW AND ORIGINAL MATTER.

BY

A. ASHMUN KELLY

*Author and Publisher of the EXPERT SERIES of Books  
for House and Sign Painters, Interior Decorators,  
Paper Hangers and Wood Finishers.*



A. ASHMUN KELLY  
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## DESCRIPTION OF ALPHABETS SHOWN

**ITALIC LETTERS AND NUMERALS.**—The Plate shown represents the best work of the most expert artist. When a quickly written and highly artistic looking sign is required the Italics are the letters to use.

**CHURCH TEXT.**—This style is indispensable for church lettering. Use the capitals wherever you can, at the same time observing good taste. You can illuminate the initial capital by placing around it a

### *ITALIC*

*A B C D E F G H I J K L*  
*M N O P Q R S T U V W*  
*X Y - 1 2 3 4 5 6 7 8 9 - Z &*  
*a b c d e f g h i j k l m n o p q r s t u v w x y z*

neat shield in gold and bright and harmonious colors. Examples of this letter are given in the Plate shown.

**THE GREEK ALPHABET.**—The alphabet here given is correct and in its best form, having also some modern improvements. The Roman letters beneath the Greek give an approximate sound of the letters. The numerals are expressed in a similar manner to that shown in the Hebrew Plate.

**THE HEBREW ALPHABET.**—This alphabet consists properly of 22 consonants, of the Chaldean square letter. These letters are not of the oldest form, but are somewhat modern and now in general use. The vowels are represented by dots and dashes; they were not employed until Hebrew ceased to be a spoken language. The vowels are placed

under the letter or within it, with the exception of the O, Hholem, sign, which is written over the letter to which it belongs. Hebrew is

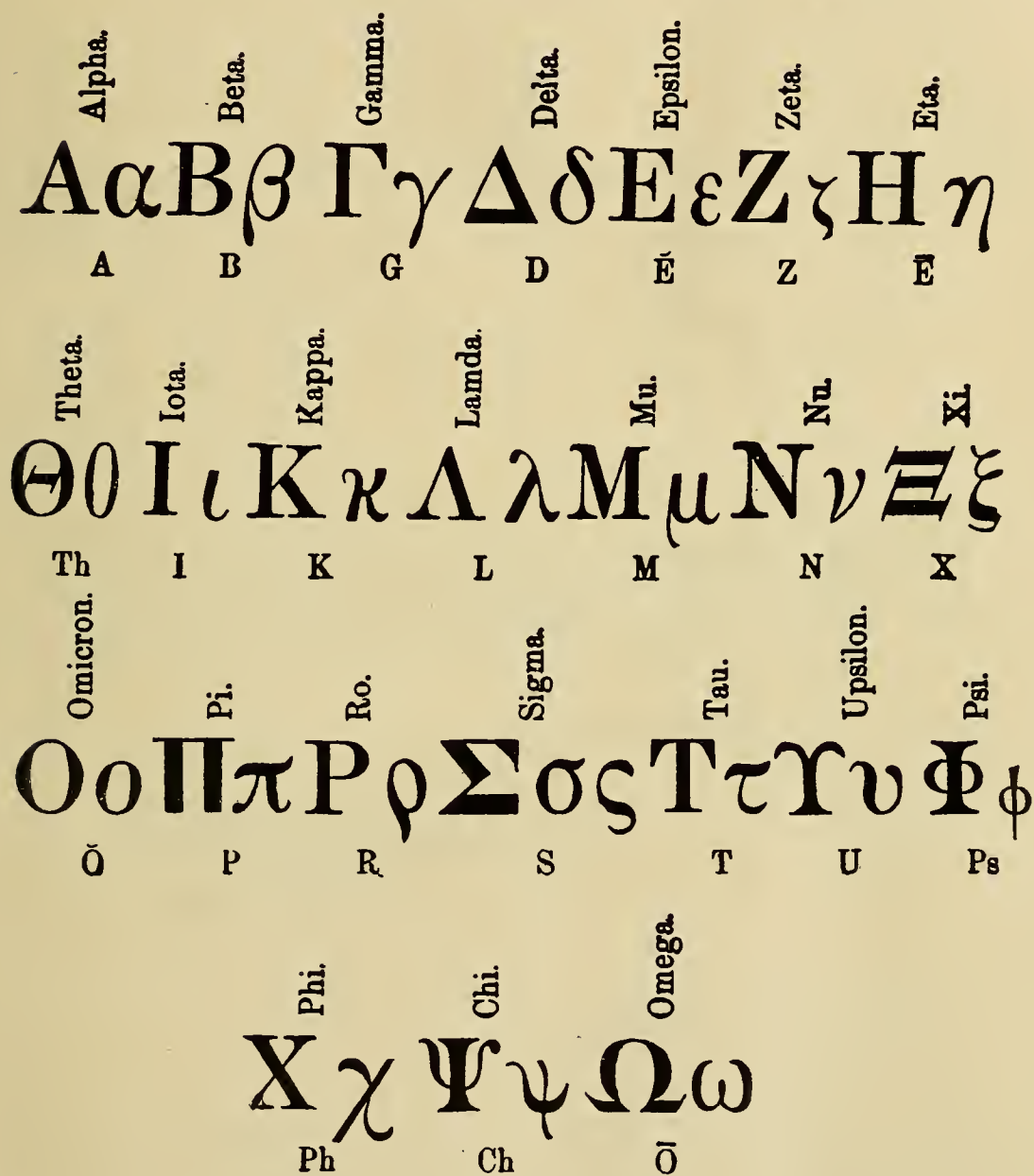


CHURCH TEXT

always read from right to-left. The first ten letters are also used as the first numerals; thence onward through the alphabet they become ten-

fold, as 20, 30, etc. The units are expressed by prefixing the yodh, or Y, to the letters.

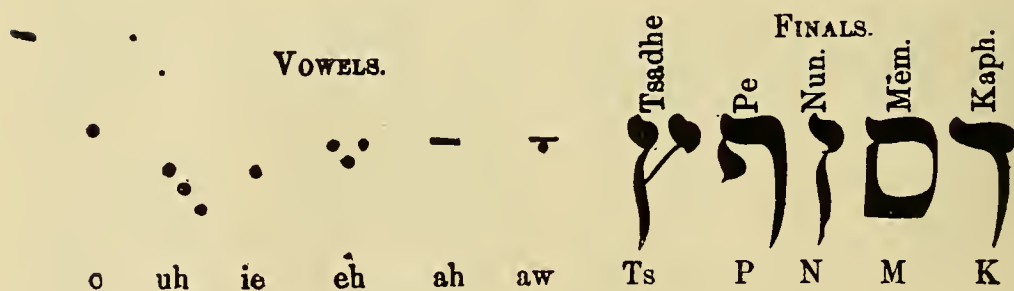
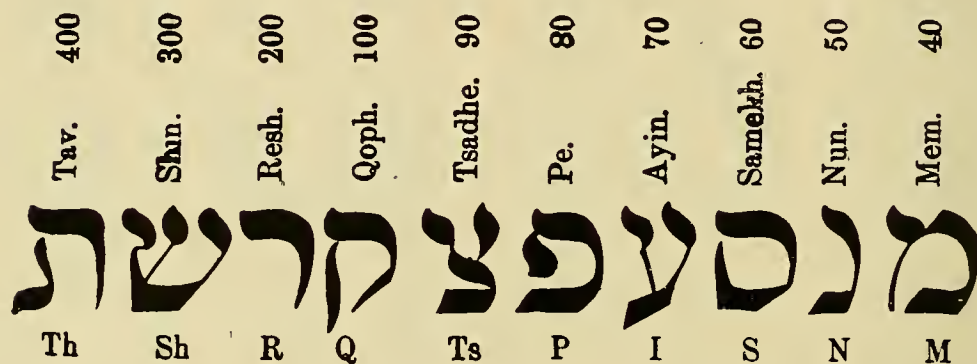
The Hebrew letter was originally adapted from living and familiar



THE GREEK ALPHABET

objects the names of which contained the different sounds of the language. The first four characters, for example, are Aleph, Ox; Beth, House; Gimel, Camel; and Daleth, Door. These letters or signs

having nearly the sound of the Roman A, B, C, D. The language has no lower-case or small letters.

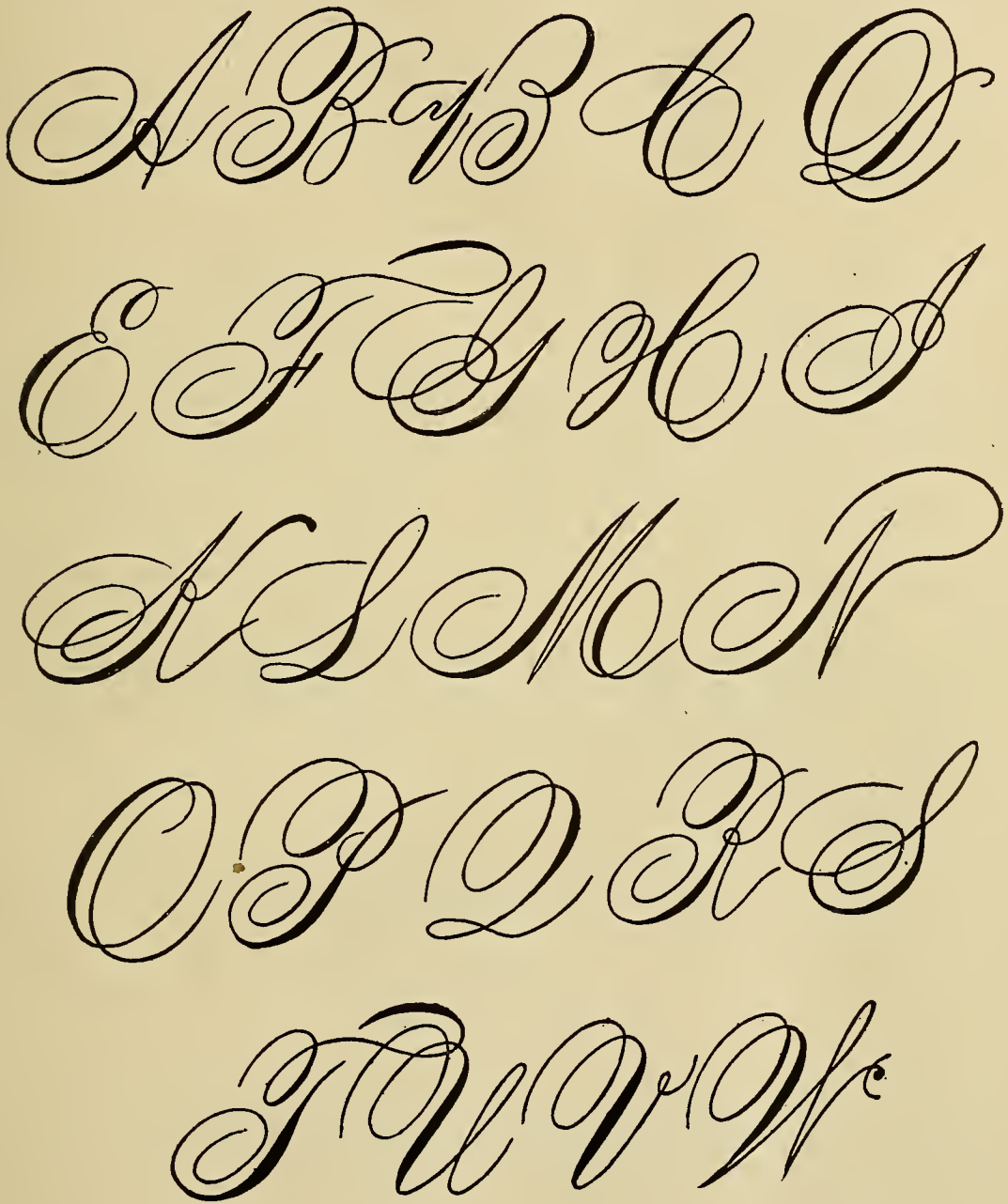


#### HEBREW ALPHABET

SCRIPT LETTERS.—These are the Spencerian system of letters, and are difficult to use in sign lettering, only the most expert being able to do a very fine job with them. In doing a sign with them do not cramp them, but allow plenty of space; the full width of the board must be used, in order to give the capitals a full sweep. Be particular about the making of the oval form in the capitals, to get it the proper shape, and likewise get the semi-angular forms correct in the small letters.



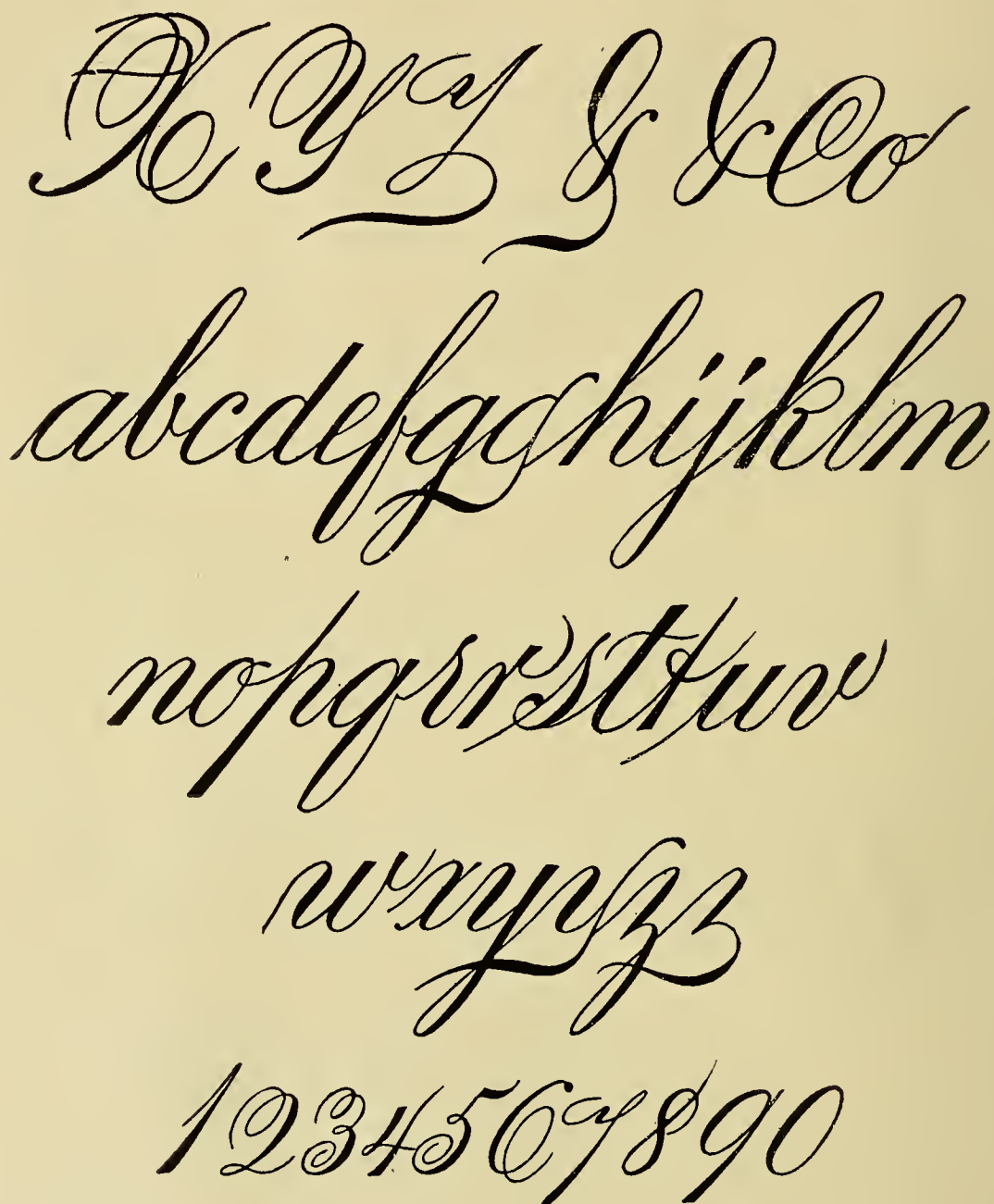
In some cases comparatively little space is required under the lettered line, for the lower loop of the g, y, etc., may be omitted, and the grace-



SCRIPT CAPITALS

ful, easy sweep to the left, as seen in the Plate, may be substituted, without violating any of the principles of the system. As a rule, the down strokes in the small letters may be heavy, or shaded, as it is

called. Only the down strokes in the capitals should be heavy or so-called shaded; two shaded sides should never be together.



SCRIPT LOWER-CASE AND NUMERALS

THE SERLIO ALPHABET.—This alphabet is the work of Serlio, done in the sixteenth century, at the time of the Italian Renaissance. Experts in lettering and artists of many nations have pronounced it the

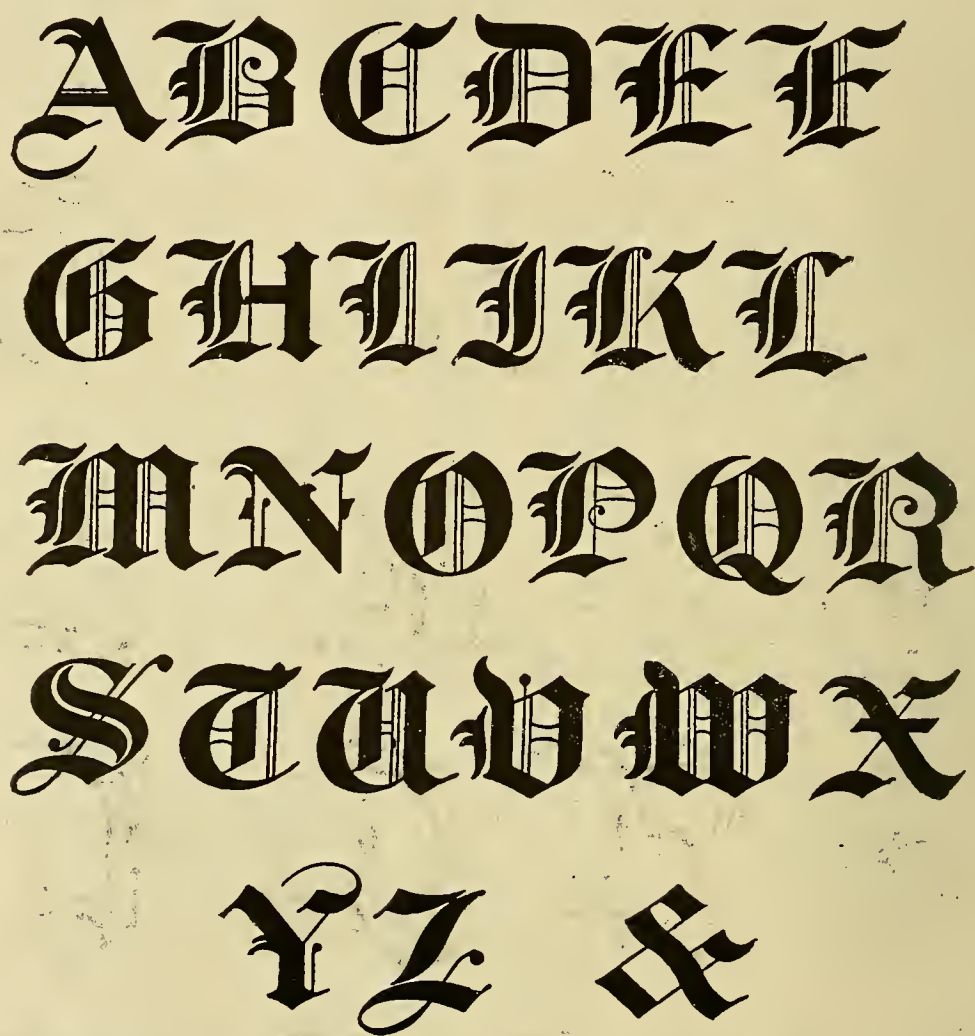
most beautiful Roman alphabet ever designed. It appears to have been adapted from the inscription letters on the Trajan column, at Rome, and which letters were done about 1,400 years prior to the time of Serlio. The easy gracefulness of the Serlio letters suggest a great improvement over the Trajan. This is particularly so in the case of letter N, and in the general abolition of the strokes of intermediate thickness; Serlio uses only two different thicknesses for his straight lines.

A B C D E F G  
H I J K L M N  
O P Q R S T V  
W X Y Z

THE SERLIO ALPHABET

OLD ENGLISH.—By comparing the Old English and German Text together it will be seen that the former is easier to read than the latter, and yet the two are often confounded together; to the expert they differ essentially. When used together indiscriminately the effect is bad, and the real beauty of each is lost. Each alphabet has its own distinct characteristics, and both are standard letters. The difference between the two is in the lines, Old English being a plain angular letter, and the German Text being without angularity, but highly ornate. Much

of the superior readability of the Old English is due to its similarity in form to the familiar Romans. While flourishes are allowable, and make the letter more attractive, yet they are not a fundamental part of the letter, as they are in the German Text.



### Old English

Old English has 25 characters, letters I and J being represented by the one character. Letters A, D, E, G, H, K, L, N, O, Q, S, T, V and Z are full-space letters, while the remainder, with the exception of M and W, are  $4/5$  space letters; M and W are  $6/5$  space letters. This on the basis of five units to a space. It should be observed, however,



that while those letters described as full-space are not all such, some really requiring a little less space, yet in laying them out it is necessary to allow them full space, otherwise it would be necessary to contract certain lines, which would mar the symmetry, as for example: E, K, L, S, and T, while not occupying full space in the body of the letter, yet in order to give graceful lines to the curves, at either top or bottom of the letter, it is necessary to allow full space.



OLD ENGLISH LOWER-CASE

With the exception of P, Q, and Y the letters can all be placed on a line, P and Q falling  $\frac{1}{5}$  space below the line, and the Y  $\frac{2}{5}$  space below. In drawing the N, V and W it will add very much to the beauty of the letter to carry the left-hand curves  $\frac{1}{5}$  space above the upper line, otherwise they will appear cramped, and it will be impossible to give a graceful sweep to the lines. The body of the letters



GERMAN TEXT

should be about  $\frac{1}{6}$  of the height in width, and in such letters as C, G, etc., it should be made a little heavier.

Fine lines should be hair-lines, very delicate and in proportion to

X Y Z z &

a b c d e f g h i j

k l m n o p q r

s t u v w x y

GERMAN TEXT LOWER-CASE



the size of the letter. When any flourishes are used care should be taken to avoid confusion of lines to maintain symmetry.

The lower-case Old English follows the capitals in having an angular formation, avoiding curved lines wherever possible.

Under the head of Old English alphabets may be listed three distinct forms: Anglo-Saxon, Old English and English Church Text. Although they vary a little in their outlines, yet they all have the same general formation, and undoubtedly have an identical origin.

**THE GERMAN TEXT ALPHABET.**—The general form of the German Print letter is constant and should not be varied in its outline. But German Text may be varied to suit the artist's fancy or taste, or to adapt it to any size or form of space that is to be filled. As the letters are irregular in form it is difficult to give any positive rules for their proportion, and yet as compared one with another they are all  $\frac{4}{5}$  space letters with the exception of G, M, O, Q, and W, which should have full space. The letters should be placed upon a line, with the exception of Y, which extends below the line; this is where the Text differs from the Print, and partakes of the Roman. The body of the letter should never exceed in width  $\frac{1}{6}$  of the height, and the flourishing curves should never be made so heavy as to overbalance or to make indistinct the general purpose of the letter. Two very important points are, first: To have the curves true and graceful; second, to maintain the same direction of curves which are used in connection. The Plate shows only a few of the necessary or supporting flourishes, in order that the distinctness of the outline may be preserved. The letterer may use his taste in the matter, adding such extra flourishes as he may desire, but he should always remember never to vary the angles of immediate lines, which would destroy the symmetry of the work.

The lower-case letters are made in the same proportion to the capitals as those of German Print, yet they vary in number, there being but 26 characters, and in their construction the same care in avoiding all abrupt angles should be observed as in forming capitals. In our Plate the lower-case Z has been placed with the capitals to fill up the space.

*Some General Remarks on the Roman Letters*

The plates showing the Roman letters, both lower-case and capitals, are photo reproductions of work done by expert sign painters. They

A B C D E F  
G H I J K L  
M N O P Q R  
S T U V W X  
Y Z &

NEW YORK ROMAN CAPITALS

are called the New York Roman style, because for many years in use by sign painters of the city giving the letters this designation. They have long been regarded as the finest examples of the letter extant, just as for very many years New York sign painters or letterers have been

abcdefghijklmnopqrstuvwxyz

NEW YORK ROMAN LOWER-CASE LETTERS

regarded as the most expert in their art. Hence the New York Roman letters are generally accepted as being standard, and while there are several modifications of the Roman letters, none excel the standard, and for general purposes none equal it. It is a perfect letter.

In making the spur of the capital remember that it is the perfect



quarter-arc of a circle. The annexed diagram shows its formation. Its base line is of the same thickness as the fine line of the letter. Its base length is determined by the dimensions of the circle.

Certain of the capital Romans have tops and bases made by the spurs, and the widths of these vary as follows: All heavy members have their bases or tops  $\frac{4}{8}$  inch; all fine-line members, as seen in A, K, N, V, W, X and Y, have  $\frac{3}{8}$  inch. The upright member of G has a spread of  $\frac{4}{8}$  inch. These proportions hold good with letters of any size.

The curve or "spring" of certain letters, such as B, D, P and R, are not true arcs of a circle, the lower part showing a greater curve than the upper part, which brings the most prominent bulge nearest the top of the curve. But be careful that you do not make this effect too pronounced.

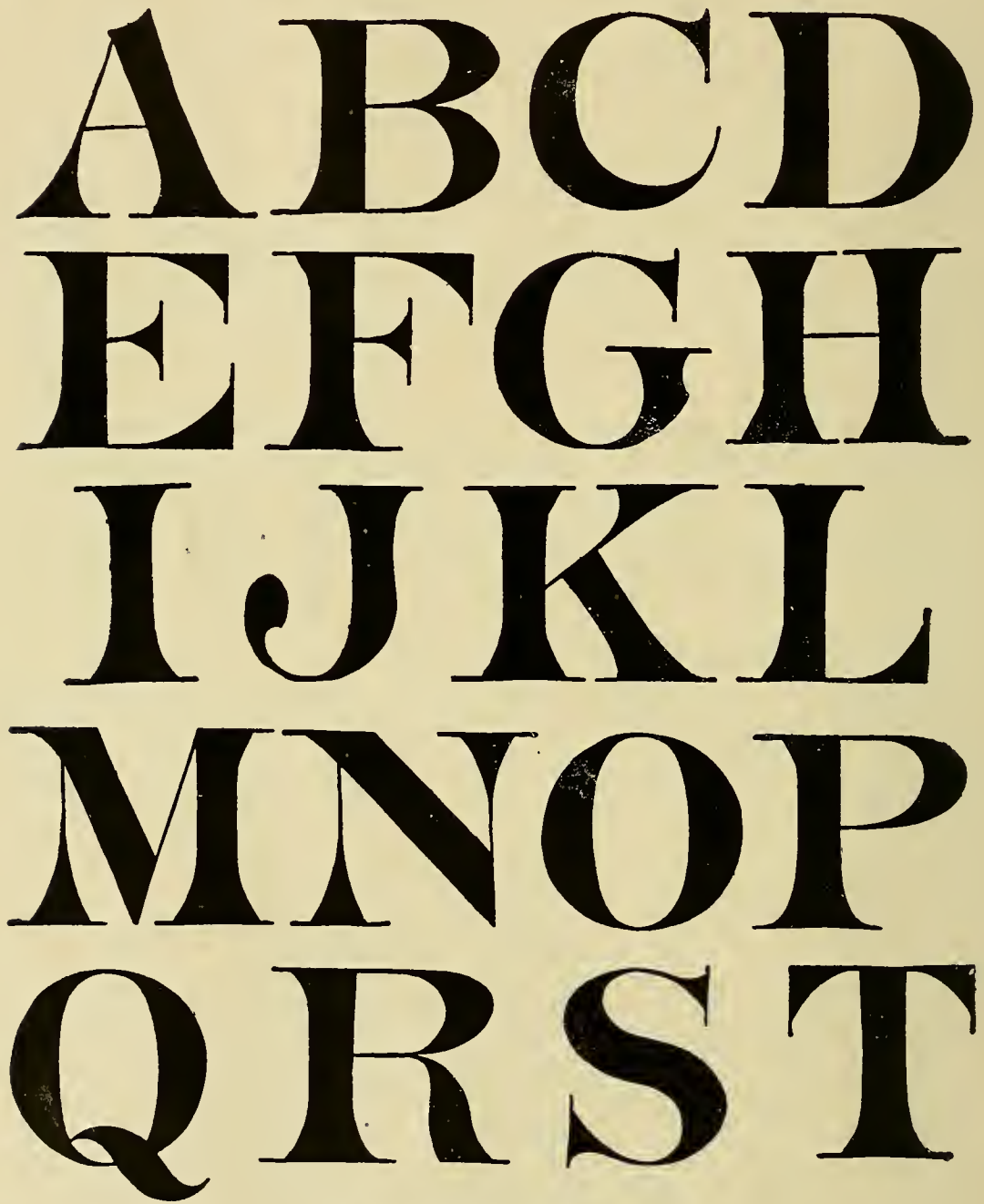
Mention has been made of the cyma, a sort of flourish seen in letter Q. This character is also used with the French Roman letter A, forming the tie in the middle, and it is sometimes seen in the middle of a letter for the purpose of filling a too great space; likewise it is used to fill up spaces between letters that show too much space, such as L and A, when shown together. But it is never used in the New York Romans excepting on the letter Q.

Illustrations of the punctuation marks have not been included in this work, for the reason that they are very seldom used in sign lettering, and when necessary it will not be difficult to get good copy for the work. They should be made to conform to the general character of the letters used on the sign.

### *The Boston Roman Capitals*

These handsome letters meet a want that demands an ornamental style combined with legibility and dignity. The main feature seen is the very fine hair-line and heavy body. Also, the swells seen in such letters as B, D, and R, are more acute than those common to the standard Romans. The broadening of the tops and bottoms of the main stems or members in certain of the letters is very unique. It is a rather difficult letter to make correctly, and it is not always made as shown in our Plate, for some sign letterers make straight or angular lines instead of curves at top and bottom. Two forms of the ampersand are herewith shown, but the second one is usually employed.

For practise work it is advised to draw lines at top and bottom, and one line through the middle, horizontally. For the spurs draw



BOSTON ROMAN CAPITALS

lines at top and bottom, parallel with the two main lines, the lower one allowing a trifle more space than the upper one, because the lower spur is rather larger than the upper one. These lines



U V W

X Y Z

& €

1 2 3 4 5

6 7 8 9 0

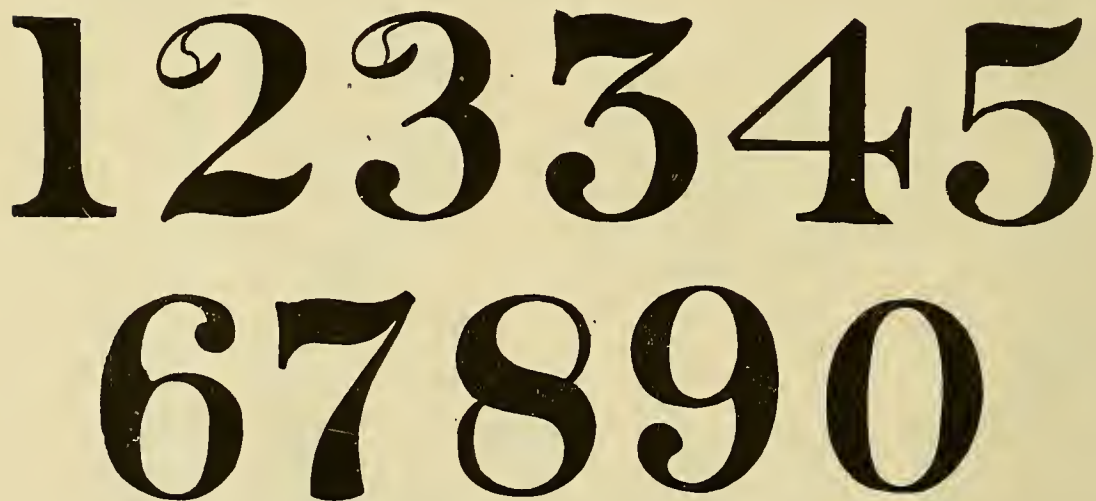
BOSTON ROMAN NUMERALS

are merely guides. Also draw vertical lines on either side to form a letter-space, and in some cases draw one through the middle, vertically. Cases of the latter kind may be found in letters V, M and W. What has been said regarding drawing the standard Romans will serve in a measure for this alphabet.

The numerals of this alphabet may be practised as directed for those of the Standard Roman ones.

*The French Style Roman Capitals*

Our plate shows a light form of this beautiful letter. It may be made much heavier, this according to the use the letters are to be put to. In ruling lines for practise work with this form of letter



VARIANT FORM OF BOSTON NUMERALS

there will be need of four, as letters B, C, E, F, G, H, P, R, S, W, Y and ampersand require a space at top of  $\frac{2}{5}$ , while the letters A, K, N, Q, X, require a space at bottom of  $\frac{3}{5}$ .

Note the frequent use of the cyma in this alphabet as in A, for its cross-bar; in C, to fill space and add grace; between M and L, again to fill up excess of space; in Q, where it properly belongs, as in the Roman Q; in W, again to fill space, this time serving to take away the appearance of too great width in that letter; finally in &, where it makes a most graceful part of the ampersand.

A B C D E F G H I  
J K L M N O P Q R  
S T U V W X Y Z &  
1 2 3 4 5 6 7 8 9

ORNAMENTAL ROMAN CAPITALS AND NUMERALS

A B C D E  
F G H I J  
K L M N O  
P Q R S  
T U V W  
X Y Z &

ANTIQUE ROMAN CAPITALS



abcdefghijklmnopqrstuvwxyz

abcdefghijklmnopqrstuvwxyz

abcdefghijklmnopqrstuvwxyz

abcdefghijklmnopqrstuvwxyz

1 2 3 4 5

6 7 8 9 0

ANTIQUE ROMAN LOWER-CASE

The numerals that go with this alphabet are quite in keeping with the peculiar formation thereof, and are easily made.

### *Ornamental Roman Capitals*

This handsome style of Roman letter is particularly adapted to gold-leaved signs on windows, or wherever an ornamental letter is required. It is essentially a true Roman letter, and its ornaments do not disguise the fact. It will be found easy to make, though care must be observed to get the ornamental parts equally formed, preserving the proper uniformity of one letter with another.

In practising work draw ruled lines so that they will serve as guides to all the parts, as at top and bottom and through the middle, horizontally.

### *The Antique Roman Capitals*

This is another variation of the true Roman letters, and presents less change than that of the Boston Romans; in fact, the changes are slight in all of these letters, and some do not differ materially, as in B, D, H, I, K, O, Q, X, the only difference being in the fine lines, which are lighter in the Antique than in the New York Roman. Note particularly the top of A, the spurs in C, E, F, G, L, S, T, Z, and the M and N, V, W, which have features like letter A. The ampersand also is different from the Roman in other alphabets.

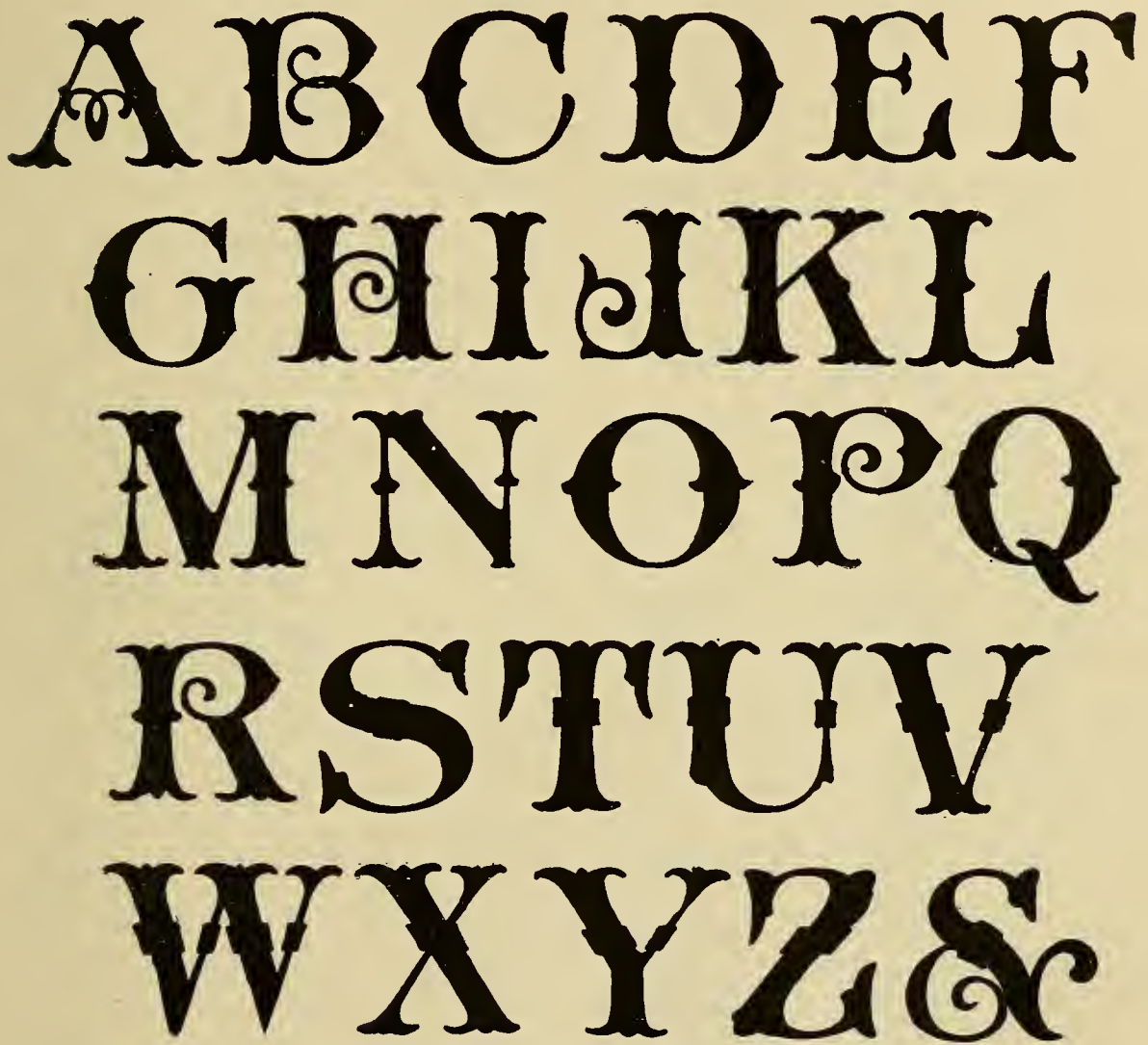
The Antique is much lighter in form than the Roman standard, though some sign painters do not make it lighter, but quite the same as in New York Romans.

Some years ago this form of letter had great vogue, and even now it is a favorite with many, owing to its undeniable beauty of form and pleasing appearance in a sign. For practise work lines may be drawn as directed for the New York Romans. Letters J, P and Y differ from the true Romans in falling below the line.

### *Antique Roman Lower Case Letters*

Like the Capitals, the Antique Roman small letters have a resemblance to the standard Romans, but with a very noticeable difference

in spurs, etc. In practise work draw five horizontal lines, the upper space having  $\frac{1}{8}$  less width than the three others, with the exception of p, q, and y, on lower space, and t in upper space, in both instances requiring  $\frac{2}{8}$  inch space. In making the lower case letters, in any



ORNAMENTAL ROMAN CAPITALS

alphabet, it will be found better to include all those letters which require certain spaces in one line, a line to each requiring different rulings. For instance, letters c, i, m, n, o, r, u, v, w, y and z may be formed in a space of  $\frac{3}{4}$  inch with horizontal line top and bottom. Letters b, d, f, h, j, k, l, t may be formed in two lower spaces

## MODERN ROMAN-EXTENDED

A B C D E F G H I

J K L M N O P Q

R S T U V W X Y

a b c d e f g h i j k l m n

o p q r s t u v w x y z



of  $\frac{3}{8}$  inch each, and upper space  $\frac{2}{8}$  inch. Letters a, e, g, k, x may be formed in the foregoing spaces, but have in addition a central horizontal line. Letters g and j require as above and also a  $\frac{3}{8}$  inch added line below.

### *The Antique Roman Numerals*

These may be ruled as in New York Romans, and otherwise require little description; they are easily formed with the pencil or brush, and are quite in harmony with the alphabets of this series. They are a useful and much used numeral, not only because easily made, but also and more to the point, they are a handsome numeral.

### *The Gothic or Egyptian Capitals*

Printers call it the Gothic, and certainly it is not an Egyptian letter; why it was first so misnamed is not known. Some sign painters call it the unfinished block, or half-block. Its general formation is much similar to the block, particularly the round block. One of the chief advantages of this form of letter consists in its adaptability to a crowded space; having no projections, as spurs, etc., it can readily be crowded up without making the work look bad. Having no spurs there is less space between certain letters than in spurred letters, hence avoiding many difficulties in spacing. Properly made they are never a spreading letter, and they look better rather condensed in form. Plain as these letters are they possess a certain beauty of form that appeals to one. While not used to any extent on good sign work, they are simply indispensable in cheap and quick work, as on oilcloth and muslin, etc. In thickness they should be a trifle more than  $\frac{1}{5}$  the height of the letter. By drawing horizontal lines top and bottom, with another running mid-way, you have good practise guides. Note the corners of Z cut off; otherwise they would appear to make the letter too wide. Note that the turn of J is cut at a slight angle, not being left square cut. So also with C, S.

The ampersand conforms admirably with the style of the letters it goes with.

**A B C D E F G H**  
**I J K L M N O P**  
**Q R S T U V W X**  
**Y Z &**  
**a b c d e f g h i j k l m n**  
**o p q r s t u v w x y z**

GOthic OR EGYPTIAN LETTERS

*Lower-Case Gothics*

These letters should be ruled so as to form a guide for making the turns on letters a, b, c, d, e, g, h, o, p, q, r, s, u and z. An eighth-inch space does this. While a quarter-inch space top and bottom does for the letters b, d, f, g, h, i, j, k, l, p, q, y, the t requiring a little less space. Thus, by drawing two horizontals  $\frac{3}{4}$  inch apart, and between the two draw one at the upper part  $\frac{1}{4}$  inch wide, the same at the bottom, then enclosing the small letters like a, c, w, etc., with two horizontals, with two next to same and of  $\frac{1}{8}$  inch width, you will have a good guide.

The numerals used with Round Block letters may also be used with this alphabet.

*The Round Block Capitals*

These are a wider and squarer built letter, or what some painters term the plug type. But the chief difference is in their having blocked terminals. Such a form is employed for lettering railway passenger cars, as they are easier to make than the Romans, and can also be elongated very much and safely, which cannot be done with standard Romans nor with Gothics, or indeed any other form. Of course, we not infrequently see cars lettered with a form of Roman in which the letters are much elongated, but they never look as well as the block.

All parts of this form of letter are made the same thickness throughout, though some make the bottom parts a very little heavier. Also, note in letters C, G, S, that in order to make the spurs show distinctly the curved line is made a trifle thinner where it joins the spur, so it will make the spur more in evidence; some simply notch the spur at that point, but this is not advisable, as it never looks right. Better thin the curve a little, and draw the line from upper part of spur on a gentle curve down to the curved member. Some sign painters leave no break whatever at the spur, to show it plainer, but make the curved line square across the spur. This gives a heavy effect to the letter, but is to be preferred to the notch.

In practising this letter draw lines horizontally through the letters, top and bottom, and in between, to fit the thickness of the horizontal



parts; also rule vertical lines, to show the width and location of the members.

*The Round Block Numerals*

It is rather difficult to make some letters round and at the same time blocked, as with O, for instance, and it is the same with the

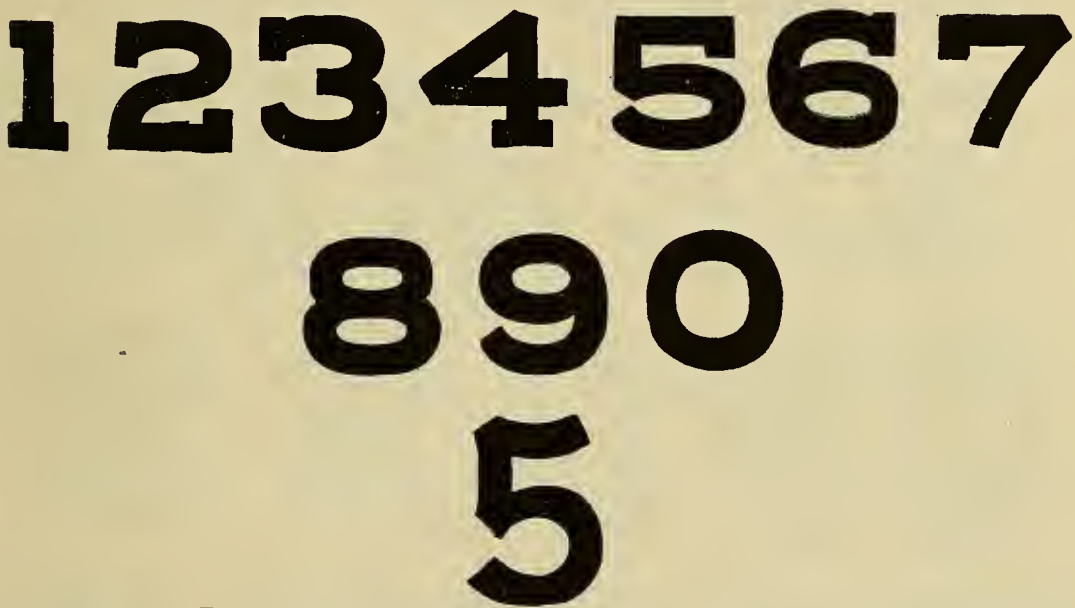
**A B C D E**  
**F G H I**  
**J K L M N**  
**O P Q R**  
**S T U V W**  
**X Y Z &**

ROUND BLOCK CAPITALS

numerals. Draw horizontal lines as required, and vertical spaces, and it will be found easy enough to make these numerals; they go also with the Gothics.

*The Full Block Capitals*

With the exception of a difference in their angular forms, this letter being rather taller and more angular, the full block is simply a variation of the round, or vice versa. It is a tedious letter to make, and not often used by the sign painter. It is useful when you want



ROUND BLOCK NUMERALS

a letter to shade or to imitate a relief letter, as those cut in stone, but the making of all the little straight cuts, as around the letter S, for example, consumes time when done with a letter-pencil and brush. It is much easier to run the curve. This is why the S of this series is usually made the same as a round block; but to preserve harmony of form every letter in a sign should be blocked, including the S.

The full-block letter originated with the stone cutter, it being much easier made than a rounding letter. To practise drawing it make horizontal lines top and bottom, with other lines paralleling them and in width accommodating the width of spurs and members.



**A B C D E**  
**F G H I J**  
**K L M N**  
**O P Q R S**  
**T U V W X**  
**Y Z &**

FULL BLOCK CAPITALS

**a b c d e f g**  
**h i j k l m n**  
**o p q r s t u**  
**v w x y z**  
**1 2 3 4 5**  
**6 7 8 9 0**

FULL BLOCK LOWER-CASE LETTERS AND NUMERALS

*Lower Case Full Block Letters*

Horizontal lines may be run the same as indicated for the Gothic lower case letters. Also upright spaces, to fit width of members and spurs. Study each letter with care, and aim to make yours as near like as possible. Note the small notches in letters d, g, h, m, n, p, r, and indents in s, etc.

*Numerals Used with Full Block Letters*

These agree well in form with the letters, both Capitals and lower case, of the Full Blocks. They require little or no description, and for practise need only to be ruled properly.

ORNAMENTAL LETTER ON GLASS.—This is merely a suggestion to the learner; it is easier to do than most other letters, hence suitable for the first effort. The black outline of letter and circle represents burnished gold; the ornamental interior is to be done in dull gold. The interior shading is the dull gold deepened with a strip of transparent color. The scrolls from the circle may be outlined and worked up in burnt sienna. The shade represents the split blended shade. The interior of circle represents sheet pearl with a metallic flitter background.

The dark outlines are to be done in burnished gold; the upper interior dull gold or burnt umber; center to be inlaid with pearl backed up with burnt umber. Lower interior is burnished gold striped with burnt sienna or burnt umber, to imitate weaving. Shade with blue or black.

## HOW TO SPACE LETTERS AND WORDS

No matter how well done the lettering, unless the letters are properly spaced, each to its fellow, and the lines of letters with each other, with also a well proportioned allowance of space at the ends of the lines, the sign will not appear well done. As a rule, the learner crowds his letters, the next fault to which is that he also makes his letters too heavy. He will also try to fill up his space, as though



A B C D E F G  
H I J K L M N  
O P Q R S T U  
V W X Y Z &

ARCHITECTURAL ROMAN CAPITALS

it were something very objectionable; but if he will study well-made ads. in the papers he will see that much is made of white-space, as it is called. A favorite method of the novice is to make some ornaments to fill the vacant spaces, and in this he makes his worst errors of judgment. A fair proportion of open space is an advantage to the appearance of a sign. But the letters and lines of letters should be well balanced in regard to the space. For the beginner there are some short-cuts at his command. Here is one for a small sign, and the small sign is the best to begin with. Take a sheet of paper the size of the sign board and on it outline the letters' spaces. Then fold the paper in the middle, which will give the center of the line of letters. The crease then should be placed on the center of the lines in which the letters are to go, on the board, and then spread out the paper. Now mark off the letter spaces from the paper on to the board; this will prevent the soiling of the board, as would be done by marking direct on to the board. It will give the exact spaces between letters and at ends of lines.

Another way is to draw the letters on paper and prick them out with an awl or coarse needle, and then with a small bag of cheese-cloth, filled with whiting or ochre, pounce the letters on to the board. If the ground of the sign is white then use pulverized charcoal. This is really simply a device for reproducing a lot of small signs, and neither this or any short-cut is advised, the better plan being to master the art by means of the eye, for even though the spaces thus made may not be exactly true, and of course they never are, even with the expert, yet the finished job will look all right. So learn to do your spacing with your eyes.

The expert method is as follows: Say it is a sign board of average dimensions, or about 18 inches by twelve feet, and that the board has been painted and made ready for the lettering; place it on the easel or pair of easels, and with a chalked cord snap a line at top and bottom of space wherein the letters are to go, with proper allowance of space top and bottom, then lay out the letter-spaces, with the words in your mind that you are to place on the board; thus as you proceed each letter will be given its relative width, and the spaces their proper areas. This is done rather roughly, the idea being to get an approximate idea of the position of each letter. This requires time to become proficient in, and hence lots of practise.



Where a single letter begins a line it is the rule to give it the same space as that between two words.

When an initial letter begins a line it is given the same space as



OUTLINED OR SKELETON CAPITALS

that given any other of that line of the same dimensions. Some sign painters allow it rather more space, but that this is wrong may be seen in the following example: "Vernon."

When a line of letters consists of capitals the first letter should be made a little larger than the following letters. Just how much larger must be left for the eye to decide, but it should not be too large. This refers more especially to the height of the letter. Some like to have the first letter on a line of capitals slightly higher than the rest, this being done with the first letter of each word on the line. But such letters should not be made thicker than the others on the line, but if anything a trifle thinner. Accent the size, and not the weight or bulk.

It would simplify the laying out of a sign were all the letters of the same dimensions, taking exactly the same space. But unfortunately, or otherwise, this is not the case. Take the round-block L letter, for instance. We find that A, K, M, V and X do with the same width. Also that a different width but one that is the same for each letter, is used in placing B, C, D, E, F, L, O, P, Q, R, S, T, U, and Z, and including the ampersand, &. The letter I takes  $\frac{1}{4}$  less space than is required by the foregoing list. Letter J requires a little less space than B, C, etc. Letters K, M, V, X, and Y require an equal space. Letter H takes a little wider space than letters A, B, C, etc., while N is a little narrower. The letter W is the widest letter.

Certain letters are more difficult to space than certain others. The following letters are considered to be rather more difficult to space when placed in certain word combinations:

F T W A V L J P J L T T N

The rule in this case is, that the relative position of letters should be such that there will be about the same amount of space between each two letters; thus, an A coming after an L, the two should be closer together at the nearest point than the two letters I and H. Taking the word TIT, it will be apparent that in order to preserve balance we must place the I close to the two T's. But in the case of HII more space may be allowed. In the word, KINGDOM, the letter I may be closer to letter K than to the N. The D a very little closer to the O than to the G, and the O closer to the D than to the M, and so

**A B C D E F G H I J**  
**K L M N O P Q R S**  
**T U V W X Y Z & \$**  
**1 2 3 4 5 6 7 8 9 0 !**

**abcde fghijklmnop**  
**qrstuvwxyz ? , " ,**

BULLETIN BOARD THICK AND THIN LETTERS

on. Round letters should be spaced close, but square letters may be allowed more space. Such letters as H and M are square ones, and letters A, L, W, Y, etc., are spaced close.

While too much space is to be avoided, yet there must be no crowding, unless this is unavoidable, as it sometimes is. If the space given to a line is not sufficient to hold the letters without crowding it is better to use a style of letter that will be better adapted for the purpose; letters without spurs, for instance. And if the line is to hold rather few letters as related to the space given, it is advisable to use a fat letter, or the Romans, the spurs of which will help fill up the space.

The space above and below the line of letters may be allowed  $1/8$  the width of the board. The space between the lines may be given rather more than this. The space between the words should be about the width of an average letter. As so much depends upon circumstances any hard-and-fast rules cannot avail.

When laying out a sign that is to be hung rather high, the distance from the ground to the sign must be taken into account; the letters must be large enough to read easily from the ground, no matter where the sign may be placed. All fine lines must be broadened proportionally. If you have access to a sign that is to occupy about the same relative position as yours get the size of its letters, and that will save you time and maybe mistake. Or you can make some letters and place them at the height your sign is to occupy and see how they look. But the letters had better be too large than too small. Large letters may be desired by the customer. Then the size of the board must be considered. Also, there are certain letters that require looking after specially, as they may not look right on a high sign, although in the shop they may appear to be perfectly right. The letter O, for instance, will appear narrow-chested when seen on an elevated sign-board, unless made fuller than normal.

Never condense a letter more than  $2/5$ , nor extend a letter more than  $5/5$ . Certain letters are well adapted to the lengthening process, while other ones may be better adapted for the shortening process. For the latter purpose use the Gothic, the French Romans, and the half-block. For extending use the block letter, also the Roman of various forms.

The purpose of an extended letter is to fill the space allowed for the



inscription. Condensing is necessary where space is rather limited or not sufficient for the regular letter.

Proportion has to do with spacing, because there are occasions when it is necessary to alter the form of a letter that may fit the space allotted to it, or that is not otherwise provided for. It is simply a matter of changing proportions.

To get true proportions of letters rule some paper so that there will be say 25 equal squares to the letter of average size. Ruling to fifths is about the most convenient spacing. Let us take the Roman capitals. What for convenience we shall call normal size letters are B, C, D, G, K, P, R, S, T, X and Z, with also the ampersand, &.

### Typical Gothic Capitals.



22

Letter requires  $\frac{1}{5}$  more space than normal. E,  $\frac{1}{2}$  of  $\frac{1}{5}$  less. F, same as E. For H deduct  $\frac{1}{4}$  of  $\frac{1}{5}$ . Letter I requires only  $\frac{1}{5}$  space. Deduct  $\frac{1}{5}$  for J. The same for L. Add  $\frac{1}{5}$  for M. Deduct  $\frac{1}{2}$  of  $\frac{1}{5}$  for O. The same for Q. For U give  $\frac{1}{4}$  of  $\frac{1}{5}$  less. To V add  $\frac{1}{2}$  of  $\frac{1}{5}$ . Letter W needs  $\frac{2}{5}$  more space. To Y add  $\frac{1}{2}$  of  $\frac{1}{5}$  more.

The rule also applies to capitals in full-block letters, while T is  $\frac{1}{2}$  of  $\frac{1}{5}$  less in the Gothic letters. The same rule also applies to condensed and extended letters. While in L, E, F, H, J, N, and T the narrowing may be even more without injury to the letters. Capitals such as C, G, O, and Q should be a little closer to each other than others, owing to their fuller sides. While the letters B, D, E, H, K,



M, N, R, U, S, X, and Z may be allowed a little more space between. All open letters, as A, F, J, L, P, T, V, W and Y are to be placed close together.

**SIMPLE SPACING METHOD.**—The unit employed in this method is that of a letter of average width with also the space allowed between the letters. Space between words, one unit. The available space in each line is divided into units of equal size, and in number equal the number of letters, plus the word-spaces. The first letter is sketched to touch the left-side of the first unit ( space). The second letter is in the same position as the first, in its units, leaving a part of the units vacant on the right to serve as open spaces between the letters.

There are three sources of variations that upset this regularity, namely: First, the different widths in letters; second, variety in spaces between the letters; third, different spaces between words. An extreme instance of the latter is a word interval with H on each side, and one with L on the left side and A on the right side. To look alike, the first space must be much larger than the second. The plan is to make the various spaces compensate each other, and to gain on I and J the space lost on the M and W. In one part of the line the letters may be in the centers, or touch the right of their unit spaces, and sometimes be even further from a regular position. Even so, by watching the progress of the work and looking forward it is easy to bring the last letter against the right-hand limit of its unit.

## HOW TO SHADE LETTERS

THERE are six forms of shading, as follows:

**THE RELIEF SHADE.**—The shadow is cast away from the letter, leaving an open space between letter and shadow. This is the most used of the six shades.

**THE CLOSE SHADE.**—The shade joins the letter, which thereby forms a block letter.

**THE DOUBLE-SHADE.**—Two close-shades of different tones of one shading color.

**THE DROP SHADE.**—The shade drops below and away from the letter, as in Relief.

**THE DOUBLE RELIEF SHADE.**—Two relief shades.

**THE BLEND SHADE.**—This shade is used on all outlined letters shaded with several colors, all of which are softly blended together. On the outer edge of the letter is another outline like that surrounding the letter itself.

The purpose in shading a letter is not merely to give it a more ornate effect, but in some cases it enables us to take up a surplus of space.

The angle of a shade is called a "slant," and it is usually, though not always, made at 45 deg. The eye of the expert is sufficient in fixing this slant, but the beginner may use a protractor, that may be made by drawing a circle on cardboard with compasses, then with the same tool dividing the circumference into eight equal parts, each radiating line giving the angle of 45 deg. Or in place of a circle use a square, run a line from opposite corners, then run a horizontal and a vertical line. This will give eight sections, each radiating line at an angle of 45 deg.

The easiest letters to shade are the Gothic or so-called Egyptian, and the block letter. Letters that have some fine lines, such as the Roman, for instance, do not lend themselves well to shading. Lithographers and glass sign painters shade and otherwise ornament fancy letters that have fine lines, but for the ordinary sign painter the plain letters mentioned are recommended for shading.

It has been urged that a flat painted letter cannot be considered as conforming to the laws of light when it is made to show a shade. That a flat object cannot cast a shadow. This may be overcome by making block letters, which will appear like those cut out of wood, and when shaded the deception is clever enough to shame criticism. Nor can there be any objection to shading a flat painted letter when the intention is merely to make it more ornate.

To conform to Nature a shade should never be in such a position that it could not be cast by the sun; for instance, say a line of letters are below the range of vision, as on the lower edge of a window; it would be wrong to place the shade on the upper part of the letter. It is sometimes done. The same rule holds with the swing sign, the shade should show from the bottom of the letter.

It improves a block and shaded letter to run an outline around it. If this is not desired, then do not let the shade color touch the letter, but let there be a little space between shade and letter.

a b c d e f g

h i j k l m n

o p q r s t u

v w x y z

1 2 3 4 5  
6 7 8 9 0

GERMAN LOWER-CASE NUMERALS



Whether the color of the blocking shall be darker or lighter than the face of the letter will depend upon the way you shade it. If the cast shade is to be on the same side of the letter as the blocking then the blocking color must be darker than the face of the color and the ground color. But if you do the blocking on the side of the letter opposite the shading, the blocking, being in full light, must be lighter than the ground color, and slightly darker than the face of the letter.

Blocking may be done with any harmonious color.

Shades are best made with such colors as umber, sienna, Vandyke brown, black, japan, or any transparent color having the requisite color tone.

Shades should be cool and quiet in tone.

The breadth of a shade should balance the body of the letter; if too broad or too heavy it will detract from the beauty of the letter.

A shade had better be too light at the start and then be worked up gradually to the full effect by shading.

The color of a letter that is to be shaded should be made to agree with the color of the ground.

Certain colors are suitable for almost any colored ground; for instance, glazes of ivory black, Vandyke brown, burnt umber, asphaltum and burnt sienna.

A shade should be of such depth as to show merely as a shade. This rule is especially good where more than one shade to the letter is used. The width may be  $\frac{1}{5}$  the width of the part that is to be shaded, but this is not a rule; the shade may be heavier or lighter, according to taste or circumstances.

As a shadow is less than the substance, so should the shade be lighter than the letter. The shade should never be too strong.

For optical reasons the bottom shade should be a little wider than elsewhere.

If the ground is darker than the letter, the shade should be two or three times darker than the ground, unless the ground is black, in which case the shade should be some bright color, a line or blended shade. It should be observed here that the blended shade is the most difficult to make. In the case being considered in this paragraph it must be a close-up shade, the shade either touching the letter, or very near it.

Some make a shade color from the letter color, adding a little white.

Thus, a black letter would have a warm gray shade; a red letter a pink shade.

When shading on a blue ground, make the shade about three times darker than the ground, but warm it a little with red. For a second shade and the darkest use Vandyke brown or Indian red in the blue, to warm it a little.

For some signs a vermillion shade, darkened at the bottom with some brownish-red, say Indian red, is allowable. But the black letter on white ground should not have a bright colored shade.

A good effect may be had by running a line of color that is two or three shades darker than the shade color on the inner side of the shade, next to the letter, leaving the usual blank space.

For black letters a good shade may be made from Vandyke brown, tinged a little with blue, adding a little white, to tone the color down to the desired shade.

The black letter on a white ground needs no shade, yet it is often done and is permissible. The color of such shade is usually stone or lead of light tone. These colors are made with white lead tinged with lamp-black, though drop-black gives a better tone. An improvement also may be made in the shades given by the addition of a very little yellow ochre.

Glossy letters should be shaded with flat color. Letters done in flat lead color, or in water color, should be shaded with flat color.

**SHADING ON GLASS.**—This is done by sketching the space intended for the shade on the outside of the glass, and filling in on the inside of glass. Outlining also is done on the inside. The outline, usually black, may be mixed with a slower color than the backing-up color, and sign painters' black, mixed with a hard-drying varnish, is advised. Let the job stand for two or three weeks after the backing-up, then apply a coat of spar varnish, and let the varnish extend a trifle over the color to protect its edges. Mix all shading color with either spar or rubbing varnish. Let it have ample time to become hard-dry.

Shading and outlining are done at the same time; the outline extends about  $1/16$  inch over the edge of the letters, this width being increased according to the size of the letters. The shade should be about  $3/4$  the width of the main stem of the letter, though this, as previously stated, is not a strict rule. Leave a space of ordinary width between shade and letter except where the letter is of a lighter color than



the ground, unless the shade is close to the letter. The space between a 6-inch letter and the shade may be  $\frac{3}{8}$  inch; and  $\frac{5}{8}$  inch for a 12-inch letter, and so on. This, again, is not a hard-and-fast rule; circumstances govern cases.

In conclusion of this part of our work a few words concerning the more mechanical side of the art of letter shading may be useful. Which side of a letter should be shaded? It is an interesting question, and the advocates of both right and left side shading present very good argu-



ORNAMENTAL GLASS SIGN LETTER

ments. But throughout past time, in the shops where apprentices were given instruction in sign painting the uniform practise was to shade on the left-hand side. And it is safe to say that at least nine-tenths of sign painters to-day shade that way. Rapid sign letterers and show card writers say that better speed is obtained in this manner of shading than by the opposite way. And speed is now the important thing in sign lettering, quality of workmanship taking second place.

It is noticed that the correspondence schools that teach lettering use the left-hand shade.

It is no doubt easier to shade some letters at least from the left side, as, for instance, the Gothic letter E. Shading on its left side requires only four strokes of the brush, as against eight required for shading the front or right-hand side. And some forms of letters do not look well when shaded on the front side, such as the Roman E, G, etc.

### DESCRIPTION OF THE PIGMENTS USED

THE sign painter requires the use of all the different pigments in his work, the list embracing those employed by the house painter, in oil, those of the vehicle painter, in japan and turpentine, and the tube colors of the artist and water colors of the decorator. He also needs very fine colors for his best work, while the common pigments, embracing white lead and zinc, and the common oil colors, answer for cheaper work. The pigments most useful to him are chrome yellow, Naples yellow, flake white, French yellow ochre, raw and burnt Italian sienna, Indian red, vermilion, crimson or scarlet lake, rose madder, ivory drop black, lampblack, Prussian blue, ultramarine blue, and emerald green.

A brief description of the principal pigments used follows:

THE WHITES.—Pure white lead, ground in oil, is used for grounding sign boards, and for certain other purposes; it should be pure basic lead carbonate, ground fine, and have a pure white color. So-called compound lead does well enough for certain rough work, but should never be used on good work. Some brands of white lead are very white, while some others are rather dark. The addition of some zinc white will make a dark white lead whiter. But it is best to buy the lead that is white without zinc white. Flake white comes in tubes; it is a superior form of lead carbonate. It is very white and has good covering qualities, being particularly useful for making white letters. But if the job of white lettering is extensive, zinc white may be used instead.

The thinning fluid for white paint for sign work is made with turpentine two-thirds, and very pale copal varnish one-third. For the driers the best pale japan is used. For dark lettering ordinary best japan will do.

THE BLACKS.—Ivory drop black is the purest and deepest of tone. It should be ground in turpentine, for sign work, with gold size and

a little varnish for a binder. If too much turpentine is added and not enough varnish to meet this condition the color is apt to rub up. Where greater durability is desired than drop black gives, use lamp-black instead. The two blacks may also be mixed together in equal proportions, making a black of good color and durability. It is a good black for general run of sign work. As lampblack is greasy it requires more driers than is good for its wearing. This grease may be removed from it by calcining, without injuring it; place the lampblack in a shallow vessel, pour on it a little alcohol, then set it afire; in a little while the fire will have burned the grease out. This rather improves the quality of the black, making it spread easier, and at the same time helping its tone. Where black lettering is desired without gloss, or absolutely dead, calcined lampblack is useful. For water color work dry lampblack is cut with vinegar or alcohol, after which it will mix readily with water or colors. For lettering on muslin the black is thinned with benzine. For certain kinds of sign work lampblack may be mixed to a paste with turpentine or benzine and adding from time to time, as it is being used, a little raw oil, working it about until like soft butter.

**THE BLUES.**—For exterior work use ultramarine blue; if a deeper shade is desired add a little black. This is the only blue that will stand exposure to the weather. Prussian blue, as also black, may be used to darken ultramarine blue. Prussian blue is a very powerful tinter but is not a stable color. One of its worst faults is that it spreads in lettering. The addition of a little limewater will correct the fault. Or the addition of a little zinc white, this being very useful when lettering with the blue on a zinc white ground.

**THE REDS.**—The safest reds for exterior sign work are Indian, Venetian, and light reds. Madder lake also is good. Indian red is useful for toning down vermilion when it is desired to darken it. The dark shades of English vermilion are the most durable for exterior work. Chinese vermilion is brighter and finer than the English, but is more costly. Either of these vermilions will darken when laid on grounds containing lead salts, such as white lead and drying japan. As driers commonly used darken vermilions it is advised that they be thinned out with raw oil and turpentine, with a little quick-drying varnish for the drier. If it is desired to varnish over the red, then add a little crimson lake, to counteract the color of the varnish; use



pure crimson lake only. Vermilion does well on a Venetian red ground.

Chinese vermilion is thought to improve with age, after its application to a properly prepared ground. It is particularly good for lettering on a white ground. Owing to the brightness of its tone it brightens any sign work on which it is employed. When using it, mix enough for the job in hand, for if you run short it may be difficult to make another mix of exactly the same shade.

Quicksilver vermilions are all liable to tarnish, but they are more durable and satisfactory than the artificial ones. The former tend to darken, while the latter become paler, according to their kind and quality. Any artificial vermilion that gets its red color from aniline dye will quickly fade, though recently great improvements have been made in this direction, so that the fault noted is now not so serious as formerly. Vermilions made on a lead oxide or orange mineral base do fairly well, unless dyed with fugitive aniline red. Such vermilions answer very well for muslin work, where durability is a minor matter. They will mix with other colors but had better not be so mixed.

**TRANSPARENT PIGMENTS.**—These are required for painting on glass; these colors are: Prussian blue, crimson lake, Indian yellow, burnt Italian sienna, lampblack, and the aniline dyes mixed with white shellac. The aniline colors do for temporary work only, as they are not fast against the light; they give very beautiful colors though. For mixing pigments named, exclusive of the anilines, take two parts of Venice turpentine and one part of common turpentine.

**PERMANENCY OF PIGMENTS.**—Chrome yellow darkens under the influence of air containing sulphur. It is a lead pigment, and with it sulphur forms black sulphide of lead. Chrome yellow also fades badly under exposure to light and air. Prussian blue, cobalt blue, Antwerp blue, and indigo blue all fade, alone or in combination with other pigments. Green produced by the mixture of chrome yellow and Prussian blue is not permanent. A green less bright than chrome green but more permanent can be made from French yellow ochre tinted with lampblack. Carmine lake, vermilion, and chrome red are unstable under outside exposure. Burnt and raw sienna, burnt and raw umber, French yellow ochre, Vandyke brown, and all earth colors are considered as being permanent under exposure. Venetian red, Indian red, light red, and madder lake are permanent pigments. By the term permanent is meant that the pigment is reasonably proof against strong

sunlight, acids, gas, fumes, etc., and that it will not alter its tone within a reasonable period. Pigments produced by the aid of heat will alter under the influence of heat of a different temperature, and will assume a different tone, becoming darker. Pigments produced by a dyeing or staining process, fixed by a mordant upon a base, such as rose pink, for instance, and which is made by precipitating an unstable lake color on a whiting base, will fade out.

Such, briefly, are the reasons why certain colors fade, while others darken. Some are affected by alkali, others are not. Alkalies do not affect Venetian red, ochre, cobalt blue, ultramarine blue, cobalt green, ivory drop black, zinc white and barytes. All the other pigments will suffer more or less in contact with an alkali.

## COLOR CONTRASTS

THE coloring of a sign board is of equal importance with the lettering. The amateur usually selects a too florid color scheme, just as he also undertakes a too ornate style of lettering. He should realize that the plainest way is the easiest way, and most likely to give pleasing results. A plain white ground and plain black letter, that is the proper layout for him. And here are some rules to guide him in the choice of colors.

To secure perfect legibility the letters must be in strong contrast with the ground; for this reason the black letter on a white ground is the most common.

Usually light-colored letters on a dark ground look better when placed close together; probably because this arrangement covers more of the ground. A pleasing and compact effect may be obtained by drawing the outlines close together and filling in the intervening spaces.

Have all tones of reds, blues, greens, etc., well balanced; be careful in the choosing of colors; when, for instance, you need a bright red avoid a fiery red; and if a warm red, don't choose a too dull red. This is a good rule in the selection of any color; be sure you get the right one.

For a delicately tinted ground choose an equally delicate color for the letters; avoid harsh coloring.

If the letters are to be shaded and the ground is a silver-gray place a white line between letter and shade. If the ground is white tinted



with yellow ochre, making a delicate shade, use a bright straw-tint line between letter and shade.

For red on blue ground it is best to use vermilion and ultramarine blue; the latter should be a navy-blue shade, rather than dark or royal blue. Such a sign will be improved in effect by outlining with white or pale blue, or with straw color; and a gold outline goes well; such outlines cause the letters to stand out clear and distinct from the ground.

For billboard signs the following table of colors has been made as being most desirable.

<i>Ground</i>	<i>Letters</i>	<i>Shade or Line</i>
Light yellow	Red	Black shade
Mustard yellow	Deep blue	Black shade
Mustard yellow	Red	Black shade
Mustard yellow	Deep blue	Vermilion shade
Yellow	Blue	
Bright orange	Vermilion	
Deep orange	Black	
Orange	Navy blue	White shade

Owing to contrast of tone the best of the above color combinations is yellow and blue. A light yellow ground with normal red letters is improved by an outline of black, which introduces a contrast of tone. A shade is sometimes given the letters, but the outline looks better. If the letters are in a deep crimson instead of scarlet the effect, for some positions, would be sufficiently strong without shade or outline. In fact, the black shade, close up to the letters, on a yellow ground, is not the best taste, as it tends to distort the letters; hence it is better to have some slight space between letter and shade. A mustard-yellow ground with deep blue letters and vermilion outline will be better without the outline. Vermilion on orange gives a poor effect, owing to the two colors being too closely allied in luminosity, and the addition of a bold black line would improve the effect.

A vermilion letter, outlined with black, or with top and left-hand side lined with white, on a greenish-gray ground, will give the effect of a beveled edge. Vermilion letters with black outline, on a drab yellowish-gray; medium blue letters on a stone colored ground, outlined with white; fawn color ground, Venetian red letters, with or without white lines; deep cream ground with letters of a medium blue; all such are good combinations.

Lemon chrome yellow letters on a black ground do not look well,

but may be improved with a vermilion outline. Deep warm yellow letters on black are much the richer color combination. With the right tone of yellow the effect is nearly as good as gold on black, and very much bolder. The ground color should not be glossy.

Deep cream or straw-colored letters outlined with a deeper yellow; white letters outlined with pale greenish-blue; white letters outlined with vermilion; vermilion letters outlined with white; are all desirable combinations, on a black ground. Purplish tints, from heliotrope to lavender, outlined white, are good variations. Medium blue, green, red, these colors may be used for lettering on a black ground, but never without a white outline.

Outlining and shading both serve a useful purpose in color combinations, as thereby harsh colors are harmonized and discords are made inconspicuous.

Gold looks well on a blue or red ground. Gold letters on a rich leather-color ground, outlined with black, or shaded with umber, are handsome.

If you have to letter with white on a black ground, tinge the white with a little blue, which will make it cover better.

Light blues, pinks, greens and purples are not suitable for ornamental sign painting.

A highly colored ground will detract from the beauty of any form of lettering.

Dark colors look best in gloss, and light colors in dead flat. This rule is especially applicable to sign painting.

Lettering in connection with fresco work, as in churches, should be done in dead flat colors.

Black letters on an orange ground do very well, but on a mustard-color ground they do even better. Navy-blue letters on an orange ground, with white shade, is good, though a white outline instead of the shade would look better.

A blue ground may vary from light blue to dark blue; a light tint of yellow-green, with a white outline, looks well on a rich deep blue, and may be further enhanced in its color values by the use of a black shade. White letters on a sky-blue or turquoise ground, with vermilion line and black shade; or, navy-blue ground with white letters; or, purplish-blue ground, white letters, and black shade, are very effective.

Red grounds may range all the way from bright English vermilion to rich chocolate; the best effect can be made with vermilion ground, white letters, and a black shade. Or, vermilion ground, deep yellow letters, and black line and shade, blended into the ground color. A pale blue letter looks well on a chocolate ground, but it must be shaded with black. Orange on vermilion, or even on a medium tone red ground, does not look quite right, but may be much improved by a black outline or shade. If the ground were a purplish Indian red it would do much better.

White letters on an emerald green ground should be shaded or outlined with black. A favorite color effect is a white letter outlined and blocked in gold, with a black cast shade.

### LETTERING BRUSHES AND PENCILS

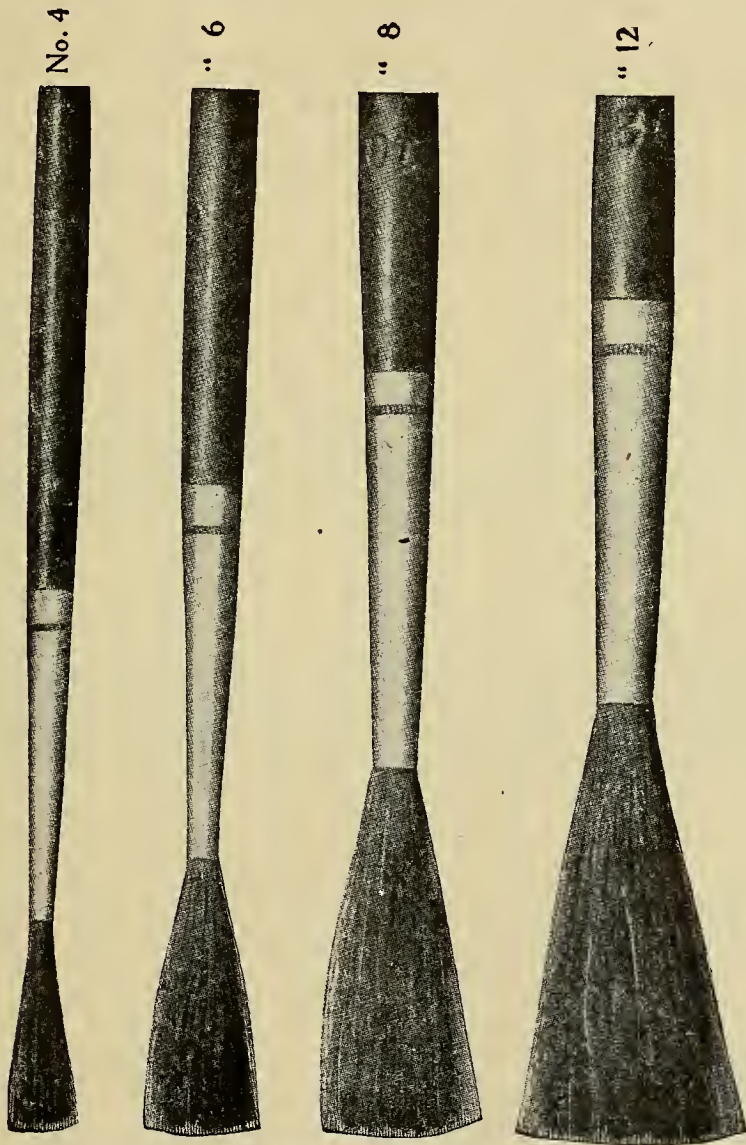
Two grades of brushes and pencils will be needed in your outfit, the best and a cheaper grade. The so-called French camel hair brushes are a little stiffer than the common sort, and are the best for general use. Sable is too stiff for some work, but is right for applying size or for similar work. Red sable is more pliable than the black sable. For general purposes the sable brushes are very good. Where the color used is light weight the camel hair pencil is preferred by most sign painters, once they get used to it. For filling-in, etc., the bear hair and ox hair brushes are always satisfactory. The two-inch camel hair mottler is used in glass gilding, for applying the water size.

You can have brushes made up of any desired length of hair, with some brush makers at least. The length of hair for heavy colors like vermilion, white or red lead, etc., should not exceed one inch, while for sable three-quarters of an inch is enough. That is, for pencils used in heavy colors. For doing large letters with extended bars hair not exceeding one and one-half inches is best. This because a truer line can be drawn with a long hair than a short hair pencil, owing to the more or less unsteadiness of the hand. The color will also be laid with a finer edge. It is advised to have a part of the black sable pencils furnished in one and one-quarter inch and part in one and one-half inch; this applies to the camel hair pencils also.

The difference between the ox hair and black sable consists in the



former being stiffer and less resilient than the other; the black sable is used mostly for glass lettering; it is very soft, pointed and resilient. Ox hair is used for lettering on board, card and oil cloth; also for single-stroke work and sign painters' brushes. Where ox hair is too coarse it is well to have a brush made up of a mixture of ox and sable hair.



LETTERING PENCILS

The lettering pencil and brush must have the qualities of resiliency or elasticity, which should disclose itself about the middle of the hair. When a pencil must be loaded at the base in order to give it the proper spring it may as well be discarded. When selecting brushes and pencils



see that they have proper spring or elasticity of hair; the hair must not be too stiff nor too soft. As a general thing, camel hair pencils don't average as uniform in quality as the sables. Whip the hair over the forefinger, which will show what degree of elasticity it has; the hair should show a readiness to return quickly to its original position, holding its shape under rough handling.

As to pencils in quills, in course of time the quills become so dry that they crack open, and have to be repaired.

To fit a wooden handle to a quill pencil steam the quill until it becomes soft, in which condition it will yield and not break. Then stand it aside until it dries and becomes hard.

The two-inch wide camel hair tip is used for taking up gold leaf and conveying it to the sized surface it is to occupy. The two and one-half inch badger tip is used for laying silver leaf, which is much heavier than gold leaf, badger hair being stiffer than camel hair. The tip requires care in its keeping; if the hair becomes rumpled, comb it out with a hair brush; keep the tips in a book, between the leaves, making the hairs lay straight before putting the brush away.

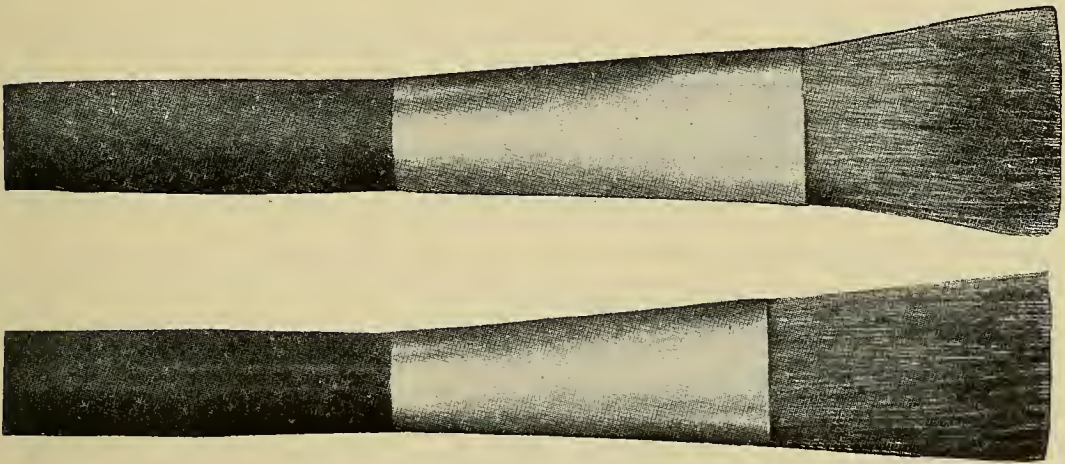
**HOW TO KEEP BRUSHES AND PENCILS.**—Clean them out with turpentine, then work some lard or other non-drying grease or oil into them and straighten out the hairs. For winter use sweet oil, and in summer lard or neat's oil. Dip the tip of the pencil into the grease or oil, then squeeze it with the thumb and finger back into the heel; then take some clean, soft waste or bit of old gauze underwear and wipe the oil out. Have a narrow pasteboard box and into it throw the pencils, heads all one way; if using a number of them, and you have no oil at hand, throw them into the box with their heads the opposite way; in this manner it is easy to see which need oiling or greasing. Kept in this manner they will last until worn out. They will not remain crooked when kinked, and are ready for use without rinsing.

Bristle brushes used for landscape, figure, bulletin, or other form of pictorial work should either be wiped dry, by brushing, or be washed out in benzine and then be washed with soap and rinsed with water.

Ox hair or camel hair tools may be treated in the same way, with good results. In fact, it is the only way to keep bristles soft and pliant, especially those which have become more or less worn.

A good way to keep the brushes used in painting surfaces is to wrap

the brush with a piece of paper of suitable size to cover the stock, around which it should be closely wrapped, extending far enough beyond the point of the brush to turn back and enclose it completely; then place it in a vessel of water, as usual. Brushes of all colors may be kept in the same vessel, and as long as there is any water in it the paper will remain moist and so preserve the bristles. The brush is not filled with water, as when dipped into water in the common way, and for use all it requires is a flirt to force out the water which may settle at the point of the brush. The vessel containing the water should have a cover. The water should be changed now and then, and only a small quantity is required, just enough to keep the brushes from becoming dry.



SINGLE-STROKE BRUSHES

Lettering pencils may be greased when put away, this grease being either mutton tallow or vaseline, or a mixture of both, twice as much tallow as vaseline. Tallow is rather too hard to use alone, in cold weather at least. As to the shaping of the pencil after greasing there is diversity of opinion. Some flatten it out when greasing it and leave it that way, but a more general practise is to round it out, drawing the hair to a point; the argument is that this is the natural form of the pencil, and that in this way it holds the body to its truest lines. The bulletin brush is usually cleaned in benzine, and it is then wrapped in paper, as previously described, and then placed in a pot of kerosene, being then ready for instant use. Bulletin sign painters are

very particular in following this simple method. The colors used in bulletin work are such, and the general work such, that soaking the brush in kerosene does not interfere with the work; it may be taken out of it and put into paint at once.

All brushes used in the sign shop should be cleaned out when done with; this will prevent the paint from clogging them at the butt of the bristles and seriously impairing the usefulness of the tool. Rinse out in turpentine or benzine, or in kerosene, which is cheaper and just as efficient. After cleaning and wiping the brush work a little non-drying oil into the butt; lard with a little castor oil mixed with it will do. Press the hairs to a sharp wedge-shape point and put in a clean place. When wanted again for use, rinse out in any of the liquids mentioned, wipe off with a clean rag, and it is ready for use. If any kinky hairs show up heat a putty knife and flatten them out on it; this will bring them back to correct form.

Preserve the chisel point of pencils having that shape. This point gives a broad, even line when used for outlining letters, and this makes the filling-in easier. It is thought by some that the pointed pencil enables one to get into corners better, but this is not correct; take letter I for instance and with the broad pencil make two down strokes with the flat side thereof, and you have the vertical sides, finishing top and bottom with one stroke; but this is done by taking the point of the pencil and using it edgewise; that finishes top and bottom outline; then about two more strokes fills in the body of the letter. Then try it with the pointed pencil.

Some pencils are square of end, others pointed. Quicker and better work can be done with the square end pencils than with the round or pointed, but one must become accustomed to them before he can handle them as well.

Always use a large pencil instead of a small one when the size of the letter justifies it.

On the smooth surface the black sable is best; on rough surfaces red sable and ox hair are best; but on very rough surfaces bristle brushes or fitches are best.

Brushes made from sable, ox hair, or bears' hair are used on muslin sign work. They come in sets. French crease-quilled brushes of camel hair are well adapted for work on painted surfaces, and are especially good on window, tablet, and office door lettering.



There are fitches and cutters of different widths for wall and bulletin work; these are stiff and capable of withstanding hard usage, as they are made for rough surfaces.

Camel hair is squirrel-tail hair, from southern Russia. An imitation hair comes from old furs, being dead and rotten, and being dyed that comes out and spoils any white or light colored work.

For all coating or filling-in large backgrounds use the regular 3-inch or 4-inch stucco bristle wall brush.

For large letters on fence or wall signs use the chiseled bristle varnish brushes, from size 1-inch up to 3-inches.

For rough board work or water color cloth signs the chiseled fitch brush is useful; better have several different sizes, to suit the various kinds of jobs that come to hand.

The black sable lettering pencil is the principal tool for all kinds of small lettering, though the beginner will find them rather difficult to handle; this is owing to its long hair, but once he gets used to it he will find that he can do better work with it than with a short hair pencil.

## CONSTRUCTION AND PREPARATION OF A SIGN BOARD

EXPERTS differ as to the selection of wood for making a good sign board, some preferring that part of a tree that is nearest the bark, arguing that such wood is apt to be better seasoned than the inner part, and also that it is less liable to warp, split or shake. Those who contend for the heart growth make about the same argument. There can be no question concerning the value of clear, well-seasoned stuff for the purpose. Air-seasoned lumber is better than kiln dried lumber, and white pine is better than any other kind of wood.

When making a large sign board it is better to use narrow boards, rather than wide ones, as in shrinking the narrow widths will leave a number of small and easily filled cracks, whereas, when the wider boards shrink, there will be fewer but larger cracks, which will be harder to fill perfectly. Again, wide boards are more apt to warp than narrow ones, forming a hollow in the middle and a ridge at the joined edges.



If you must use wide boards, then select them so that they will differ in grain, its growth, direction, etc. Or you may canvas such a sign.

When a sign board is to be more than two feet wide it will be well to use two or more boards, rather than one board two feet wide; for anything more than a foot wide the tongued and grooved boards are best. When well put together such a sign board will look even and solid.

A board that is to be lettered on both sides cannot be cleated, but if well made, with a strong frame, and the sign is not large (as such signs very rarely are), tongued and grooved boards will give a sign board that will stand without cracking. If wider boards are used, and are not tongued and grooved, the edges may be secured with glue, or may be dowelled together. In the latter case the dowel pins and edges of boards should be glued, to make the best job. Narrow boards also would be better with glued edges.

Cleats of right width and thickness should be firmly screwed on the back of the sign board; use plenty of screws, and countersink the heads. Nail end pieces to the sign board, to prevent ends drying apart. Put a rim around the board, letting it extend over the face of the sign, forming an angle, in which place a moulding; this strengthens the sign board and adds to its appearance.

As a sign board is exposed to all kinds of weather it is necessary to make it water-tight and solid in every part. Putty all joins or breaks, openings, etc., and make a smooth and well painted surface, back and front, including the ends. The back should have at least one good coat of paint, well rubbed in, and two would be better than one. Any irons, supporting the sign, should also be well painted.

The priming of a sign board of the best grade requires the best white lead paint, thinning with pure raw linseed oil, and adding only a very little driers. Some sign painters thin the white lead with equal parts of raw oil, turpentine and japan gold size. Others prefer to size with a good coach varnish, adding to it some black when the ground is to be black or dark. This method is used to obviate the use of shellac, which is used when there is sap, knots, etc. But the coach varnish will not prevent pine sap or knots from showing through the paint; only shellac will do that.

When the priming has become quite dry it may be sandpapered smooth, dusted off, and all defects puttied with white lead putty. Some

painters prefer to shellac on the bare wood and glaze with white lead putty, made from dry white lead and keg lead in equal parts, and making into a paste with quick drying varnish. The surface is levelled up and all defects filled with this putty, using a wide glazing knife, after the manner of the carriage painter. When dry it is sandpapered smooth and level. In the ordinary manner, where the defects are puttied with common putty, it may be necessary to shellac over the putty, as it would not become hard enough to paint over successfully unless shellacked. The green or undry putty would sweat through the paint.

The second coat of paint is made with keg white lead thinned with equal parts of raw oil and turpentine, with a little drying japan; this coat should be medium heavy and be well brushed out. The third coat consists of white lead in oil thinned out with raw oil, adding just enough turpentine to cut the gloss; if the surface is painted with too glossy a paint it will cause the lettering to creep. If a pure white ground is desired then add a portion of zinc white; some white leads are quite white enough.

To make an extra good surface, apply on top of the second coat a surfacer or rough-stuff made from Reno's filler three parts, and dry white lead one part; mix to a paste with equal parts of rubbing varnish and gold japan, thinning with turpentine to a working consistency. When this coat is dry it should be rubbed with lump or block pumicestone and water, to a smooth, even surface. On this foundation are then laid two or three coats of flat color, which may be white or any desired color; each coat to be smoothed lightly with hair or fine sandpaper. On this the lettering may be done. Or the surface may be varnished before lettering, as desired. This may seem a very elaborate preparation, but there is another one that is very much more so, it being used by British painters.

Sign boards are canvased when it is desired to save money in the lumber, as when a larger board is desired and at a low price; the lumber does not have to be first-class, and by stretching the canvas tightly over it a very nice job results. Then there is the old sign that is in very bad condition; you can cover it with canvas easier and cheaper than by scraping or burning off and making smooth, which in some cases would be impossible. There are two ways to canvas the sign; either stretch the goods tight, and tack, or attach the canvas to the sign with a paste made from white lead in oil thinned with

equal parts of boiled oil and turpentine, with a little hard drying varnish of good grade. Apply this, and while it is still fresh lay on it the canvas or duck, stretch tight and tack, pressing it down on to the paint. The next step is to apply a coat of glue size, and on this coat of paint made from white lead in oil, thinned with raw oil 1/4 part and turpentine 3/4 parts; this will give a paint neither brittle or too elastic. When dry it is ready for the lettering. Another way: Give the board two coats of priming color, sandpaper smooth, and apply a paste of white lead in oil, japan gold size and dry white lead; apply a stiff coat of this and lay the canvas on it, press down with a roller or cloth, and remove all air blisters. When dry give it a coat of glue size, following with a coat of thin glue size, which, when dry, is to be lightly sandpapered with fine paper. Some omit the glue size, but if used it is best to apply it under the last coat of paint.

If a sign board scales it may be due to the wood being undry when painted; or, if it is a metal sign, the metal had not been properly painted. There are, of course, other things that may be responsible for the trouble, such as hurried painting, fatty paint, oily coats on top of each other, too much japan driers, varnish over oil paint, paint or color too heavy; yellow pine will sometimes cause scaling; water getting in at the back of the sign, paint unevenly applied and too heavy or stiff will cause peeling or blistering; unseasoned lumber causes much trouble.

Never paint a sign board with a flat brush, as it will not rub it out evenly enough; use a round brush, made with hog bristles, as softer hair will not allow of proper spreading out of the paint. A rather flat paint, one not all oil, is best, and should be mixed rather stout, but be thoroughly rubbed out, otherwise it will produce a rough surface. Use the best white lead, thin out with pure raw linseed oil and turpentine, whether gum or wood spirits matters not, one being as good as the other for this purpose. The priming coat may be white lead and oil, but after that it is best to use some turpentine in each coat, and not too much japan, so as to get a good hard surface.

## HOW TO PREPARE AND USE GOLD SIZE

WHEN raw linseed oil is left exposed to the air for some time it assumes a viscid condition, due to its absorption of oxygen. The chem-



ist calls oxidized the sign painter, fatty—whence fat-oil size. This fat oil the sign painter finds the best adapted of any substance he has tried for gilding on wood. It has to be thinned for use, and when it has been applied to a surface it dries more or less slowly, according to his wishes. In its normal condition, excepting that it has been made thinner with turpentine or other liquid, it dries very slowly, and during its drying process it exhibits three different stages that the sign painter recognizes as setting, drying, and dry, or hard. Between the last two stages it assumes a condition known as “tacky,” or “on the tack.” This tack is the most valuable feature of fat oil, for it holds the gold leaf securely, and it may be made to either dry quickly, or hold its tack for one or more days, or even for weeks. The advantage of this consists in the fact that where a quick job of gilding is required the size may be applied and leafed the same day. On the other hand, circumstances might require a postponement of the leafing or gilding until next day, or even next week. Say you had a very large job of gilding, where it might be necessary to size one day, and not be able to gild for several days. This is easily arranged by “tempering” the oil size, or slowing it up, or hastening it. A little raw oil will slow it, while turpentine or quick drying varnish will hasten it. Fat oil made from raw linseed oil dries slower than that made from boiled oil; for either oil does for making fat oil. To fit an oil size to be applied one day and leafed the next morning add one-tenth as much turpentine drying japan as you have of fat oil. Or use two-thirds fat oil and one-third finishing varnish, with a few drops of gold size japan. To slow the size, use a slow-drying varnish; quick-drying varnish will hasten the drying. Some add a little chrome yellow to the size, to approximate the color of the leaf, and this pigment is a self-dryer, hence assists in drying the size. Of course, the greater the proportion of fat oil in the size the slower the drying, though the addition of a retarding agent, such as raw oil, will make it still slower.

So that we see how easy it is to regulate the drying quality of fat oil size. Adding a little pure boiled oil to fat oil, and also a trifle of lemon chrome yellow, will give a tack that will dry perfectly in 24 hours, but will hold a good tack for 48 hours, at least. For inside work, where a very quick size is demanded, a very good size may be made from the best japan gold size, with a few drops of fat oil and a little yellow chrome, for color and body. To slow the size, add a



little hard-drying varnish, not too much, but just enough to slow it and no more.

Quite a number of gold sizes may be made without using any fat oil. One such, and which may safely be used in three hours after application, may be made from equal parts of finishing varnish and japan drier, colored with yellow chrome. Some prefer to use  $\frac{2}{3}$  varnish and  $\frac{1}{3}$  japan. Another size for quick work may be made from one part japan gold size and three parts coach japan. For instant gilding take one part quick levelling varnish and two parts of gold size japan. For a moderately quick drying size, for ordinary work, mix together one part wearing body varnish and two parts of coach japan. A size that will take the leaf in two hours may be made with one pint of the best copal varnish, one-half pint of the best coach japan, and one gill of japan gold size.

Gold size, or oil size, is very sensitive to changes of temperature; the size will not hold a tack as well in wet or cold weather as in dry and warm weather. The size will be weak; to restore it give it warmth.

The more time you give to the oil size to dry the better or more permanent will be the gilding. Experts consider that a size is just right when it will dry with proper tack in 24 hours, and hold that tack for some hours longer.

Some sign painters say that oil size gives best results when it is made up the day before using it.

Fat oil is the best for exterior gilding, but it should be tempered with a little fresh pure boiled oil, with a little chrome yellow for color.

As to the addition of color, or yellow chrome, it should be said here that it always makes the size work harder, as it does not flow as well under the pencil or brush.

But the addition of some yellow chrome will prove useful when you have a very thin leaf to handle; some leaf is so thin and poor that it is full of tiny holes. Also, when you have a narrow line to gild the chrome will keep the size from spreading. But for ordinary work and good leaf better omit the chrome yellow.

If the size is too heavy it will cause the letters, etc., to stand out from the board.

When the size becomes too dry breathe on it.

When gilding is to be varnished don't use fat oil size, but japan gold size or varnish.

Apply the size with a bristle brush on large letters, but use a camel hair brush on small letters; even on large letters the soft brush does well, making a smoother surface than bristles are capable of doing.

If the oil size becomes too soft in summer, add a little varnish.

When a sign has been gilded in the shop, and the weather is warm, better get it into a cooler place if you can, to keep the size from sweating through.

When oil size is too heavy it runs or sags down from the letters and does not dry properly; the leaf is apt to crack.

When you have a job of gold work outdoors you need a quick size, and japan gold size answers the description. There may be dust, or winds may arise, and other possible adverse conditions all call for quick work.

Some sign painters time the size, having a bottle of the various degrees of drying size on hand, to fit any sort of work.

Some say that fat oil size should never be thinned with turpentine, and that should it need thinning it were better to use boiled oil.

When the size runs to fat edges it needs to be thickened with heavy fat oil, for it is too thin.

A little boiled oil will retard the drying of japan gold size; don't use raw oil, for that is likely to make the size curdle.

Gold size made with japan gold size does not resist the heat of the sun very well, but a little boiled oil added to it will greatly improve it in this respect.

Fat oil size should be used quite thin, and for thinning it use benzine or gasoline; these liquids make the spreading of the size easy and in that condition they make a smooth surface, while the liquids soon evaporate. Such size is fine for getting a good burnish.

To get a good lustrous burnish, one that will retain the fine color of the gold leaf, use a size that will have a tack at the end of about 48 hours; if gilded too soon the gold leaf loses its burnish. When the leaf and work are both right the gold will retain its bright color unless fouled with smoke and dust.

Be careful in the use of both boiled and raw oil sizes; raw oil is almost sure to sweat through and spoil the leaf by deadening its color, and the boiled oil is also, though not as surely apt to do the same thing.

Keep the fat oil size in a well stoppered bottle or jar.

If the size is too dry it will not hold the leaf well; if it is too wet or soft it will sweat through and deaden the leaf.

Commercial gold size of poor grade is made from equal parts of boiled oil and rosin oil. It has a gluey appearance and an odor.

Gilding done over fat oil size should never be varnished.

Sometimes japan gold size will curdle when you mix fat oil with it; or it is the fat oil that curdles, whichever you choose, but some japan gold size does act that way.

Use quick size in winter, and if needs be, slow it with boiled oil; this ought to give the right tack in 24 hours.

### *Formulas for Making Gold Size*

There are many ways of producing oil and other gold sizes, as we shall see by the following list. Raw and boiled make the most-used fat oils for general purposes, through the simple process of oxidation, or exposure to the air. Fat oil may also be produced by chemical means, and such oil size is sold by paint stores.

The value of fat oil lies in the fact that while it is capable of drying apparently hard, yet it will retain some tackiness and this will hold gold leaf securely. It is a varnish, in a degree, but a very elastic one, one that never would become solid-dry.

Fat oil size made from raw linseed oil dries slower than that made from boiled oil.

FORMULA No. 1.—Boil pure linseed oil, then place in a vial, tie a piece of coarse-mesh muslin over the opening, to keep out foreign matter, and hang in a sunny place. It will take several weeks for the oil to become fatty, but it makes a fine size.

FORMULA No. 2.—Take pure raw linseed oil and treat as described for boiled oil; it will require much longer time for oxidizing.

FORMULA No. 3.—Boil pure raw linseed oil in a copper or porcelain vessel, and maintain a temperature of 500 deg., Fahr., for from three to four hours. Then stir in about ten per cent. of best liquid drier or gold size japan. This will make a thick, viscid substance that must be thinned out with turpentine when required for use. Do not thin with benzine.

FORMULA No. 4.—This is an old-fashioned way. It takes an extra good size, however. Heat some raw oil in a pan, and when it is so



hot that smoke arises from it take it from the fire to outdoors or other safe place and set fire to the oil; let the blaze continue for a moment or two, then place a pan over it, to smother the flame. Then let the oil stand until cooled a little, place a little red lead and litharge in a wide-neck bottle or glass jar, then fill the same with the oil. Keep it in a warm or sunny place for about two weeks, shaking it each day. Then the oil is to be poured carefully into another and similar vessel.

FORMULA No. 5.—Mix together dry yellow ochre two parts and dry white lead one part; add raw oil to form a thin paint. Place it in a wide-mouth vessel and hang in a sunny place for a few weeks, at the end of which time the oil will have risen to the top of the paint, and have become fatty. This is a quicker way than where the oil alone is left to oxidize.

FORMULA No. 6.—Place one quart of pure raw oil in a wide-neck glass vessel and add a quarter-pound each of sugar of lead and powdered litharge. Tie thin open-mesh muslin over the top of the vessel, place where it will be warm and get some sun, and shake it occasionally. In a few months it will be an excellent oil size that will not require driers, and that will dry with the proper tack in from 24 to 60 hours.

FORMULA No. 7.—Heat one-half pint of raw oil and add to it two ounces of pulverized gum animé; add the gum very gradually by stirring in, and boil until the gum is dissolved, and the mass a little thicker than wood tar. Strain through a coarse muslin. When ready for use grind with it enough vermilion to make the oil opaque, but not too much so. Thin to working consistency with boiled oil; the size should be in such condition that it will flow freely from the brush or pencil.

## GILDING SIGNS ON WOODEN SURFACES

THE surface for gilding on should be made as level or even and smooth as possible, for a first-class job. The painting should be slightly flat, not a full gloss, or it may be a varnish surface, according to requirements. If too glossy the lettering color will incline to creep, and the gold is more apt to attach to those parts adjoining the letters, and would be difficult of removal. If the surface should be the least tacky then it will have to be prepared; a favorite method with some



is to beat up the white of an egg with water— $\frac{3}{4}$  pint warm water to one white of egg, and apply this. When the sign is done and dry this size may be moved with warm water. This size should be applied to every part of the surface. In place of egg size many use whiting, dusting over the surface from a pounce bag, which deposits the finest of the pigment only, and does not apply too much. The English sign painter uses the egg size, and also dusts it over with whiting, for he is very thorough and painstaking in his work.

The inscription may be laid out with a crayon, or it may be pounced on with a pricked stencil. In the latter case the pricked letters should be slightly larger than the sign letters are to be, so that the whiting or other pigment used in pouncing may not come on a line with the penciling, as when the oil size is applied if it comes in contact with the dry pigment it will spread at the dots.

If the lettering is to be done on a varnished surface the surface must first be washed off with water and sponge, followed with a wipe off with wash-leather. This will prevent the egg size from cissing when applied, and which in turn would fail to coat the surface completely.

To set out the lettering snap a chalked line for the top and bottom of letters, then carefully set out the letters, if a pounce pattern is not used. This work, together with spacing, etc., is treated fully in another place.

The next step is to size the letters for the gilding. The oil size, described elsewhere, should be thinned with benzine or gasoline, which will make the size easier to apply, and the fluid will soon evaporate, leaving an even film of size that will allow of good burnishing; never thin up the size with turpentine, for that would injure the tack of the size. Fill in the letters with the oil size just as neatly as you will expect the finished letters to be done, unless the sign is to be smalted, in which case it is not so important; in fact, we would, in that case, allow the leaf to go a little beyond the limits of the completed letter, as will be described elsewhere.

The temperature of the shop where the gilding is being done is important; it should be about 70 deg., Fahr., or not much lower than this, and in cold weather the work should be where no drafts of cold air can touch it.

A size that will be ready for the leaf in about 24 hours is usually about right. It requires a very slight tack to take the leaf, and you can test it by gently touching the knuckle of a finger to it, being careful not

to get any grease on the size. Fat oil size is a slow size, japan gold size is a quick size; but oil size may be made quicker by adding some japan gold size to it, the amount added determining the degree of drying power. A full explanation of this subject will follow.

It is a good plan, when it can be done, to size in the letters before the end of the day, and then in the morning try the size for tack. But it is easy enough to so regulate the drying of a size that you can gild at any desired time. Suit your convenience. The oil size will give a better burnish than japan gold size will give. When the size has the right tack it will take the leaf without breaking it. When the tack has been lost through coldness breathe upon it, or let it remain in a warm room until soft.

Having sized-in the letters and the size having the right tack, proceed to lay the leaf. There are different qualities of gold leaf, some too much alloyed to make a good gold job, and some too thin to cover properly. Get the best. Some leaf is full of pinholes, having been beaten out too much. In this case two leafings would be best, though usually this backing up color is made from yellow chrome, which hides the pinholes.

For the beginner patent gold is easiest to handle, as the gold leaf is slightly attached to the paper leaves of the book, and hence the slight disturbance of air that would blow away a loose leaf of gold will have no effect; in fact, one may gild with patent leaf outdoors, in a gentle breeze; but a breath of air will rumple or blow away an unfastened leaf. Yet it is a question even among experts as to which is the best way to transfer the leaf, whether from the loose or fast leaves. But I think the consensus of opinion shows that the latter method is the best. As one sign painter puts it: "Gilding direct from the book is to be left severely alone, though for large work it is expeditious and cleanly. Gold leaf from unrouged books is very nearly as easy to lay as transfer gold." It should be explained here that when gold leaf is placed in paper books, as it always is, if the leaf is to be loose, the paper is rubbed over with rouge or red chalk, which prevents the leaf from adhering to the paper. Transfer leaf is that leaf that is secured to the paper leaf by great pressure; there are other ways of attaching the leaf to the paper, which is explained in another place. Here is a method used by an expert: Cut white tissue paper in pieces a little larger than the book, and, without waxing anything, insert one between each leaf of

the book containing the gold until you have, say, six books done thus. Then lay the books evenly on top of each other, then take two pieces of inch board, about the size of the books, one at top and the other at bottom of the stack of books, and place them in a vise, screw up as tight as you can, and leave them over night. When you examine the books you will find that the gold leaf is adhering to the tissue paper leaf, the rouge preventing the gold leaf from adhering to the paper leaf of the book. But the books may be bought with the gold leaf prepared in this manner.

Coming back to the laying of the leaf, and assuming that you are using transfer or patent leaf, cut strips of the gold leaf according to the width of the letter's members. Let the strip be a trifle wider than the member, and where more than one piece is necessary to do the member let the second strip lap over the first a little, so that the join will not show. To place the gold on properly, take the strip in the left hand, place it at the bottom of the letter or member, and with the right hand gently press it against the size, moving the hand upward. Then gently press the strip with the thumb or finger so that all parts of it become securely attached to the sized part. Then throw away paper strip. As stated elsewhere, letters not above three inches high may be gilded solid, as the time saved will more than compensate for the loss of gold involved. It is very easy to gild on wood, with the oil size, but the main matter is to get the gilding even as to color, and smooth.

After you have finished laying the leaf take some prepared cotton wool, and gently rub off the surplus gold leaf, as described for glass gilding. The leaf will not leave the sized parts, but having nothing to attach it to the other parts it will come off readily. If, when this has been done, you find some places where the gold has not taken, take some of the pieces left from cutting the strips, or some of the loose pieces of gold leaf that have been removed from the sign by rubbing, and repair all breaks or ungilded places. Press these lightly and rub again with cotton wool. If now the job looks solid and good, you can call it done, or line it, running an outline of black, for instance, around the letters, which will make them stand out better. This line must be very fine, and other colors may be used as well, Naples yellow being a favorite one, and blue, etc., may in some cases look best. Or if the gold letters are on a black ground they will look well without any outlines.



The size seems to be the important thing in this work, for if it is too soft, the gold will become dark looking, and if too hard the leaf will not wear well. A strictly first-class job will have lustrous gilding, and the gilding will continue bright for a long time. Most beginners make the mistake of using too soft a size; it comes through the very thin leaf and drowns it, to use the technical term. Better a little too hard a size, for in that case by breathing on it the hard size will take the leaf and give good gloss.

### *Notes on Gilding*

Pale gold leaf is alloyed with silver, hence does not stand exposure well, tarnishing. For exterior gilding the medium shade leaf is best. The best gold leaf is 22 karats fine.

If the gilding blooms it has stood too long in the shop and in impure air. Remove by rubbing lightly with damp chamois.

The XXX leaf is best for gilding on wood.

One book of leaf should gild  $11\frac{1}{2}$  square feet.

Keep gold leaf in a dry place; dampness and cold injure it. If there is a doubt about it being dry when you wish to use it place it in a warm place for a while.

To test gold leaf place a drop of nitric acid on a sheet of glass and then lay a piece of the leaf partly in the acid and partly on the clear glass. The acid will not alter gold. If the leaf shows any change it is not pure.

There are 25 leaves of gold in a book.

The real color of gold leaf is blue or green.

Varnish must sometimes be used on gilding, to protect it, but it dims the luster of the gold, and changes its color.

To varnish gilding use a thin coat of the best wearing body varnish and let it stand two days; then apply a coat of the best elastic finishing varnish.

For a hurry-up job apply a thin coat of white shellac, which will protect the leaf and not scratch it as brushing on hard varnish will. By hard is meant copal. The shellac may be applied the day the gilding is done. Then the finish varnish may be applied.

Gilding done on oil size may be burnished at once. Water-size gilding must be dry before burnishing.

If the oil size is too soft when the leaf is laid it will injure the luster



of the gold. A very slight tack is enough to hold the leaf; better too dry than wet. Breathe on the size if too dry.

For gilding on wood one leafing is sufficient; but glass requires double-leafing to be perfect.

If some of the leaf adheres where not wanted it may be removed with a damp chamois.

If you have to touch-up a spot in the gilding don't leave a ragged edge but cut the letter clear across; still better, re-gild the entire letter.

Size and gild a little beyond the letters if you are to cut-in around them with paint, as in smalts work. Then the paint will come up well onto the leaf, ensuring a better hold.

To prevent paint from creeping on the leaf breathe on the leaf a few times.

If the paint on the board that you are going to letter in gold is not perfectly dry better apply a light coat of shellac to the letters before size is applied.

If the laps where the edges of leaf meet show better stipple same with ends of bristles of new sash tool.

The smoother the size the smoother the letters will be; use thin oil size.

## THE SMALTED SIGN WITH GILDED LETTER

THIS is sign done on wood, which is to be well painted and made smooth. The paint is white lead colored to a slate color with lamp-black; the paint must be one capable of drying hard and without luster. On new wood two coats will usually do, but the surface must be solid enough to bear out the size and the cutting-in color. Sandpaper smooth and dust off clean. Sketch in the inscription and general layout. The lines for the letters may be snapped with a chalk line, unless the board is small. After having sketched the letters with a crayon, fill them in with fat oil size. The size should extend a little beyond the outlines of the letters. When the size has the right tack lay the gold leaf. It has the right tack when almost but not quite dry; press the knuckle of a finger against it, and if you can barely discern a tackiness.

it will do. It requires very little tack. Use patent leaf, that which adheres to the book paper and may be cut into strips with the scissors. The strips should be a little wider than the space they are to cover. Lay the bottom of the strip carefully against the lower part of the letter space, and with the other or left hand run it up to the top part. This is easily done. The paper leaves the gold leaf without difficulty. Very small letters should be gilded with one piece entire. A whole leaf may sometimes be applied this way. Time is more valuable to the sign painter than the gold leaf, hence he does not spend time trying to do the work with a very least use of gold. Moreover, there is practically no loss, as he carefully sweeps up the surplus leaf with the cotton wad, and sells it; he calls this gold "sweepings."

If you will happen to be unable to get the patent leaf you may get the same kind by rubbing some wax on the back of the leaf of loose gold. But you will have no difficulty in getting the so-called patent leaf.

After you have laid all the letters with gold leaf let the job stand until next day; then rub the gilding with a wad of cotton wool, which will remove any surplus gold and burnish the leaf. Then it is ready to cut-in with color. This color is made from dry lampblack mixed with boiled linseed oil on a slab of glass or marble, using a spatula, the mass being worked until butter-fine. Then add white lead in oil until enough has been added to make the mass a dark gray or slate color. The white lead gives the paint the necessary body. If the job in hand is a small one thin the paint with equal parts of boiled oil and japan drier. If a large job, omit the japan, which would cause the paint to dry too quickly. This paint will do for all dark colored jobs of smalting, but where light colored smalts are to be used white lead tinted to match the color of the smalts should be used.

The cutting-in color should be applied rather stout, and boiled oil is advised, as it has more body than raw oil.

To facilitate the cutting-in, or painting around the letters, we would advise that you have a straight edge and lay it along the top of the line of letters, then with your small color brush or pencil run the color along the tops of the letters, in which way you can easily make true lines; the same with the bottom line. With a small ruler you can then true-up the sides of the letters. This not only enables you to get nice true lines

for the letters, but it saves time. After cutting around the letters, fill in the remainder of the surface with the color. Lay it off smooth, for every ridge or brush mark is bound to show when the sand goes on. And there must be a good coat of paint, and of good body, in order to hold the sand when it has been sifted on. Nor should the cutting-in color dry too fast, for this would cause shiners or streaks in the finish. Because the paint has nearly dried and cannot take the sand, the paint shows through in streaks. Another advantage in using boiled oil in the ground color is that it does not creep on the edges of the letters and cause ragged edges, as raw oil paint does. Another disadvantage in using raw oil in the paint is that it will not take the sand well, being too thin. Boiled oil and plenty of white lead with the black is the safe rule. Use no japan, turpentine or raw oil.

Cutting-in color made exclusively of black will run in streaks and leave ragged edges on the tops of the letters, over which the paint will run.

If you have a very large or long sign to smalt, don't try slowing up the paint with raw oil, but cut in about as much at a time as you can sand promptly, sanding to within a foot or so of the place where you left off the color, then cut in more, and so on, until done. Always have your cutting-in color ready and enough of it to do the job; if you run out of it before the job is done you may imagine what is likely to happen. Cut in the letters as fast as you can, using a small brush or pencil, according to size of the job, and fill in the remaining space with a larger brush; a soft hair brush is best, as bristles are apt to give too thin a coating and not do as even and smooth a job. It is very essential to get a perfectly even and smooth surface, for if it is the least uneven the sand will show up much worse even than the paint. To get a velvet-like surface with smalts you must get a perfect painted surface. To prevent the cutting-in color from creeping on the gold breathe on the gilded letters at the edge.

Sift the sand before using; if you cannot remove the fine particles of dirt or dust, let it fall from a height, say the top of a step ladder, on to the canvas cloth. Some let it fall on to the sign from a height. The idea is that the sand, being heaviest, gets there before the dirt, which falls on top of the sand and can then be blown off. It is important to have clean sand. Never sift the sand on fresh color, say that which has been applied within two hours or so; when the paint has stood long



enough it acquires a little tack, then it will take and hold the sand better than fresh paint will.

How long should the sand remain on before shaking it off? If the sand is very fine it may be dumped off as soon as finished; but coarse sand must remain on longer, from an hour to two hours, according to conditions. The sand should never be coarse, but where it has been used several times it gets coarse, because the finer particles have been taken out in the smalting process, leaving the heavier or coarser remain.

Where fine sand has been used it may be best to give another application, after shaking off the first; this will catch any possible thin places. But this is very seldom required.

Begin sifting the sand on one end of the board, sift carefully and regularly, getting it on evenly. A good rule to follow is to sift on the sand until the gilding is hidden.

Smalting requires abundant light. The temperature of the shop should not be too high; it will cause trouble in cutting-in and laying the foundation of paint. In winter get away from the stove; in summer hunt a cool part of the shop.

Clean off all chalk marks left from the lay-out, as the cutting-in color when it comes in contact with the chalk will cause ragged edges. Better trace the chalk pounce with a lead pencil, then wipe off the former marks. A charcoal crayon is better than chalk for setting out the inscription, for it will not cause ragged edges; however, it can only be used on a flat painted ground.

Block shaded letters on a smalt ground may be done with the color on the board before smalting. Let it dry, then cut in with the smalts color. High lights and shades can be put in on the sand after drying, using thin color and a fitch.

To smalt on sheet iron, make the first coat very dark lead color; second coat with the color of the smalt, sift the sand on evenly, and dump off the surplus. For an extra good job paint over the sand and apply another sanding. The first sand must of course be dry.

To smalt galvanized sheet iron sign first wash the sheet with strong sal soda water and then rinse with clear water. Rub dry, or let stand until dry. Coat with best yellow ochre ground in oil, thinning with equal parts of varnish and turpentine. For the ground for smalts make a paint from lampblack, in oil, and about ten per cent of white lead; make and use the paint stiff; then sift on the smalts.



## STENCILLING LETTERS ON SIGNS

**CUTTING THE STENCIL PLATE.**—Tough manila paper is used for stencil plates, and for large surfaces it is better than a metallic plate, the latter being best for smaller work and where it is to be used for a long time. The paper must be shellacked on both sides, some using a thin coating of quick-drying varnish instead. Then the letters are cut out, using a sharp knife and a plate glass for cutting-board. Some prefer wood instead, as it saves the edge of the knife, but there is danger of the grain of the wood causing a miscut, which cannot happen on glass. Perhaps a smooth and very hard wood might do as well as glass, but glass is commonly used. The cutting-knife should have a thin blade and be kept sharp. Cut carefully, making the letters as perfect as you can. When done cutting out the letters shellac the stencil plate again, on both sides.

To avoid ties showing, make a duplicate stencil, cutting out slightly more than a half of the letter on each stencil plate, the lower half of one and the upper half of the other. Or, if the letter is of such form that a tie must remain, then cut out a part of one stencil so that the parts will hold together; then cut out that part in the duplicate that is represented by the uncut part of the other. For ornate stencil designs it will sometimes be necessary to employ more than two stencils, cutting out a portion of each plate so that when completed no ties will show.

By the two-stencil plan any letter may be made without ties, say letter O, and also, if desired, you can make the upper half one color, and the lower half another.

**TO SHADE THE LETTERS.**—If shading is required prepare another plate and on it draw and cut out the shades as they are to appear on the sign, no ties being required. Or, shade with the stencil plate by placing it below and beyond the letter, paint in the shade, and afterwards fill in the angles with a small brush. The bottom shade must always be somewhat darker than the side.

**CORRECTING ROUGH EDGES.**—Sometimes the letters will show rough or ragged edges; in this case run a line of another color along the edges, overlapping them a little. An expert will very rarely have this correcting to do.

**TO MIX AND APPLY STENCIL COLOR.**—Usually stencil paint is ap-

plied with a brush, but sometimes the roller is preferred, especially on a big job of cheap work. The paint for the brush should be mixed rather stiff, using only enough oil to bind the paint, and thinning out with turpentine japan. If coach color is used, that ground in japan, then thin out with turpentine only, but do not make the paint thin. For the roller, the stencil used is rather lighter than that for the brush, say No. 16 manila paper. The paint, too, is made thinner. The roller is covered with felt, as this material will hold considerable color, and not part with it too rapidly. Fill the roller full of color and then work it out on a board, to remove excess, and spread the paint evenly on the roller. Should the stencil not lay flat, give it another coat of shellac.

Stencil paint should be made very nearly dead flat, in order to get clean-cut edges. Mix it stout, and use the smallest possible quantity on the brush; rub the brush out on a board each time you take up paint. Apply the paint with the brush in a circular manner, pressing down on the plate firmly so that it will be as close as possible to the surface of the work. Don't pounce the paint on, as many workmen do, but apply as indicated, firmly and with a circular motion.

**MAKING A LARGE STENCIL PLATE.**—If a large stencil is required, and intended for long service, it may be made from shellacked stencil paper; but if the paper has first been oiled and then given two or three coats of shellac, on one side only, and then while the shellac is still wet lay it on fine muslin and press down with a sad iron, you will have the most durable and flexible kind of a stencil plate. After cutting the stencil give it another coat of shellac. Two coats in the first place are usually enough. After using the stencil clean it off, and keep it clean, using benzine and rag.

**ZINC STENCILS.**—For certain kinds of work the zinc stencil is best. Thin sheets of zinc are used. Lay out the letters and paint around them with asphaltum, and when dry coat the back of the zinc with a thin wax, applied warm. Lay the plate on a level table, and make a half-inch-high wax dam around it, as in glass and copper plate embossing. Mix one part nitric acid with three parts water and pour it on the coated zinc sheet, and in due time it will have eaten through the unprotected zinc letters. Of course a vessel must be under the zinc to catch the acid when it eats through. After this, clean off the asphaltum and wash off with clear water.

**STENCILLING ON GLASS.**—Make the lay-out of the sign on stencil paper, cut out the parts desired out, lay the stencil on the glass and fasten it there; then lay in solid with gold leaf. Let it dry, then repair any breaks, as in ordinary glass gilding. It will be best to make a stencil frame, fastening it to a work bench or table, with hinges. This frame should fit the glass rather loosely. Take a one-inch piece of wood, size of the glass, and fasten it to the table in such a manner that the pattern frame will fall directly over it. Now lay the glass, with gilded side up, on the block, let the pattern fall into position over it, breathe on the gilding, which will show through the cutting in the pattern, and rub out the exposed gold with a stiff bristle brush; some use an oval horse hair brush. Breathing on the gold leaf will keep it moist, in which condition it rubs out easily. Do all the signs of the lot in hand this way, then rub out through the second pattern the same way as you did the first. If three stencils are required then proceed with the third as with the first and second; see that each stencil registers perfectly on the sign. This rubbing through the pattern removes a certain part of the gold leaf, the surplus, and leaves the lettering distinct. Paint the background with oil color, spreading the paint uniformly over the surface; and then, before the paint is dry, sift on flock of any chosen color, this to give the back of the sign a neat appearance. Such signs are made usually for the show case or window.

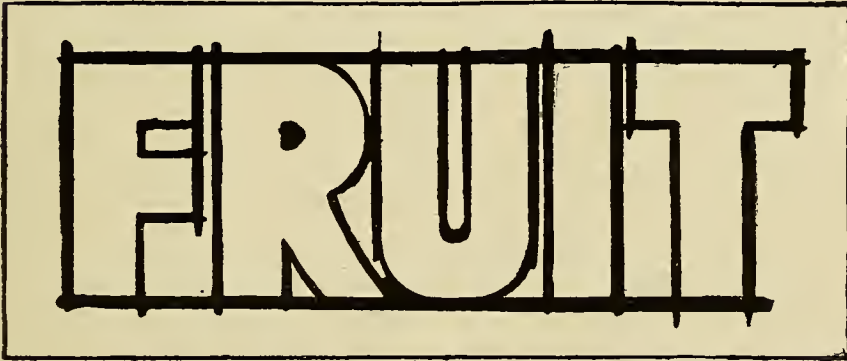
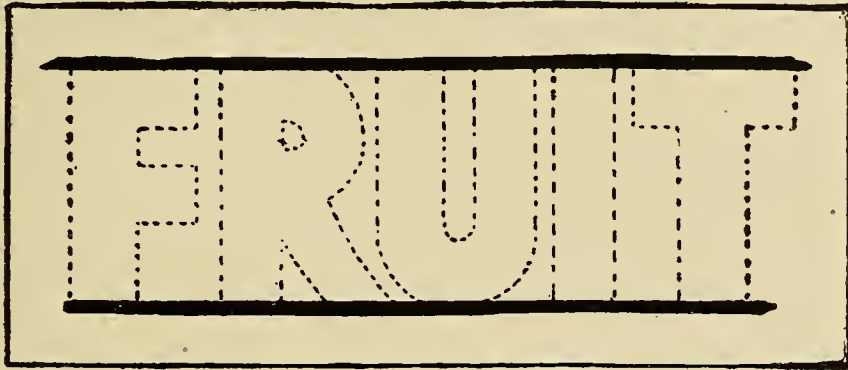
Small signs, like the **TO LET** and **FOR SALE** signs, may be done with stencils, and save time. Letter patterns, or paper cut-out letters, etc., are similar to stencil work in saving time and labor. Tracing around cut-out letters makes the job look more like real hand work, but even stencil lettering may be given this effect by a little trimming up by hand afterwards. However, such signs serve a temporary use, and are not expected to be works of art, though they must not look slovenly, either.

The stencil pattern that is designed to paint in the background, this being the reverse of the usual stencil method, has the letters remaining, connected by ties, so that all but letters and ties are painted in. The ties may afterwards be removed from the work. A border may be provided in connection with the lettering, and ties are allowed to connect it with the letters.

**STENCIL DECORATION ON GLASS.**—Stencil decoration is sometimes applied to glass, though pencil work has greater durability. Stencilled



work is also frequently touched up with pencil work in order to sharpen the outlines and to tone down roughened surfaces which might furnish a foothold for moisture, which is liable to be followed by peeling. The use of oil in such cases is not advisable, as gold size paint dries more



THE POUNCED-IN SIGN

quickly and adheres more tenaciously to the glass. A method of treatment by which very beautiful effects can be obtained is to stencil in semi-transparent glaze colors on the glass, blending and shading in



various tones by using as many different pots of color and providing separate brushes for each. The tones can be blended very smoothly and softly, the work being done all at the one application. Oil paints are used very successfully in the latter class of work as these blend more readily. A coat of varnish is applied over this for protective purposes.

Stencilling upon ground glass is also done with very good effect. By this means a semi-transparent ornament may be produced upon an opaque surface, thus preserving the original qualities of the glass. Brunswick black should not be used on glass for embossing purposes, except as a first coat to be followed by freehand brushwork, since the acid passes quite readily under the edges of the work, making these irregular and ragged. Stencils may also be used to a limited extent in gilding on glass.

**TO MAKE CLEAN-CUT WORK.**—In order to get clean-cut lines on glass with the stencil, it is necessary to make the stencil soft and pliable by coating it with a mixture of equal parts of paraffin and benzol, which must be allowed to dry before using the stencil. The color used must have its oil extracted by spreading it in a thick coat on blotter paper, first having made up a creamy paint with oil color and a little paste drier. This is spread on the blotter about an hour before you wish to use it, in which time most of the oil will have been absorbed by the paper. For use, thin with turpentine. It will not clog the stencil, nor crawl on oil-painted ground. Use a good stencil brush, dip it lightly into the color, and dab the color on carefully.

## METAL SIGNS

**THE CAST BRONZE TABLET.**—The cast bronze tablet sign is designed by an artist, then a wax plaster or clay model is made, and from this is cast the tablet. As the casting is in one piece care must be taken in its making. The moulder has to make an exact reproduction of the model, and see that no flaws occur in the casting. He works quickly and deftly, when pouring the molten metal into the mould. The smoother the casting the less the amount of work afterwards. After being taken from the sand the casting is cleaned of the sand that adheres to it, the background is made smooth, and the lettering is filed to an even surface. Next, a workman, called the chaser, takes the work in hand, and scrapes

and tools the border; this work takes from two to three weeks, after which it goes to the chemical department, where it is treated with certain acids, and the desired color and finish is given it.

This is an expensive sign, but very attractive and what some call a dignified sign. It outlasts the ordinary brass sign, and needs only to have the letters and other polished parts kept bright. It has no filling to fall out, as occurs with the brass sign plate, and which must have its whole surface kept polished.

**RAISED BRONZE LETTERS.**—These letters are attached to sheet metal, usually of 17 gauge. There is also a wooden backing, made from patterns furnished by the salesman who took the order. The carpenter makes the wooden part, while the metal-worker fits the metal background and border to it, or bevels the edges of the background. Then the letters are arranged on the sign by an expert workman, after which the job goes to the "assembler," who drills holes through the background for the fastening of the letters. Then the letters are polished on a buffing wheel, and the background goes to the oxidizing room, where the color is given it. This color may shade from a blue-black to light chestnut brown. Finally the assembler fastens the letters to the background, and includes with the sign the necessary directions to the buyer and the fasteners; the job is then ready for the purchaser.

**THE INLAID OR ENAMELED SIGN.**—The designer, an artist in this kind of work, draws the required design, which is then transferred to the metal and outlined thereon with asphaltum varnish. All exposed parts that are not to be etched are coated with wax, after which the plate is laid in a vessel containing an acid, and it is allowed to remain in the acid for several hours, say from three to ten, this depending upon the weather conditions and the character of the metal. Then it is taken from the acid bath and washed in clear water and then dried. Now from three to four coats of enamel are applied to the etched parts and then the plate is put in an oven for baking the enamel on. The temperature of the oven should be 300 or 350 deg., Fahr., and the plate should be left in the oven for from two to three hours. The sign is then taken out and all excess enamel is removed. Then it is returned to the oven and baked for five hours. Being then removed from the oven, it is allowed to cool, after which it is polished and attached to its wooden backing.

**BRILLIANT AND DIAMOND SIGN LETTERS.**—Let us assume that you

are to place the merchant's name in the center of his window, and that you are using a 4-inch letter. With every order received the manufacturers of these letters send a full-size pattern of the concaved portion of the letters. Take tin foil and spread it on a plate of glass with water; rub it down smooth with a hard rubber or block of wood, placing a sheet of paper under the block or rubber to protect the thin tin foil. Now lay out the name on the back of the smoothed tin foil, carefully spacing the letters with chalk. Then take each one of the patterns separately and lay them on the foil, backwards. With a sharp knife or needle cut the foil around the pattern; then with a tin or steel straight edge cut the foil again, about  $3/16$  inch farther out from the pattern; cut and pick out the foil between the two cuts, leaving an outline letter through the sheet of foil on the glass. Fill in this space with whatever color you may wish, and let it dry. Remove all the foil from the glass and attach the letters by cementing the flange of the letter to the colored edge line; then with strips of foil that have been varnished and allowed time to become tacky fasten the edges of the letters down, and then back them up with color of edge line. Should you wish to finish the job with a black outline, stick the letter to the glass with cement. Do not use too much cement, which may exude upon the face of the letter. After the letter has been made fast finish out the black edge line with a pencil, then back up the job.

In doing this kind of work never lay it out in a double curve, which would spoil the lay-out; use only a straight or arched line.

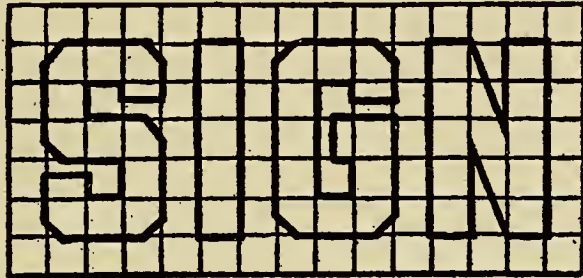
The makers of these letters will furnish instructions for mixing the colors, and include the cement.

Should you have to panel the window, first lay the border in gold leaf, then finish up in any design required. Then lay the tin foil as previously directed, and put in edge line in any desired color. After the color is dry take off all the foil outside of the edge line, leaving the foil letter inside of the edge line on. Paint the panel any desired color, and stipple it; paint right over the edge line and foil letters. When this groundwork is dry peel off the foil letters, and if the panel is to be perfectly opaque back up the whole with foil put on with varnish; this will hold all securely. Should you desire to shade the letters on the panel do it before putting on the background, like dark green, chocolate, black or blue. No outline may be needed in such cases. When removing the foil you leave the foil letters on the glass



and shade them. Should you shade the letters on the plain glass do it after you remove the foil from outside the edge line and before you remove the foil from the inside of the edge line.

**JAPANNED TIN SIGNS.**—Black japanned tin for signs comes in different sizes, and also may be cut to meet any special requirement as to size. Such signs are very popular for sill signs, for physicians, dentists, etc., and are usually lettered in gold leaf or gold color paint. Take a sheet of manila paper, an inch larger than the tin, draw the desired inscription on the face of it with a pencil, making the letters



as perfect as they must appear on the sign, with the necessary border space around the letters. One way is to lay the paper on the tin and fold the edges under the tin, then lay in your letters. When you have pencilled the letters in, remove it from the tin and turn it up side down and rub whiting or dry yellow ochre over the unlettered side; turn this colored side down on to the tin and carefully fold over the paper to hold it to the tin. Take a hard lead pencil with a sharp point and carefully trace in the letters, which will result in transferring the inscription to the face of the japanned tin. Lift the paper and gently blow away the loose pigment, size the outlined letters, if for gold, or paint them in. If the letters are to be gilded you will have to protect the face of the tin with egg size, made by beating up the white



of an egg with water; some use the cut side of a raw potato. When dry trace in the design or letters, and fill in same with fat oil size, using a thin size, else the letters will appear raised. To prevent laps of leaf showing there should be plenty of tack to the size, as it is always very difficult to gild on japanned or any very smooth surface, unless the size is exactly right. Cut strips of leaf from the book, and apply. For small letters a solid piece, enough to cover the entire letter, will save time and waste. After the gilding is done remove surplus leaf with a wad of raw cotton, repair any possible breaks, then set it aside until the next day, when the sign may be cleaned off and delivered.

Exactly as you pencil the letters with the size will your lettering appear; therefore trace the letters carefully with the size, and use thin size, avoiding fat edges to the letters. A trifle of white lead added to the oil size will improve it. You will find it best to apply the oil size one day and gild the next, but the size must not dry too much. It must have plenty of tack, as already stated.

**LETTERING ON WHITE TIN.**—Take a sheet of bright tin and wash well with sal soda water, let it dry, then coat it with pure white lead thinned with turpentine and adding a little varnish to bind it. Give the tin two coats of this paint, each coat to dry hard, sandpapering to produce a smooth surface. Letter with any desired color, ground in japan, and thinned with turpentine, with a little varnish as binder. The sign may be varnished when dry enough. The back of the tin should have one coat, to prevent rusting.

Another good effect may be obtained by painting the background some light color, and outlining the letters in black and shading them. The outlining and shading make the letters look as if standing out from the tin. Some scroll work may be added, if desired, then the sign may be varnished.

The best paint for tin should be something like that used by the carriage painter, one possessing both elasticity and hardness. A quick drying color will not do, nor will oil paint; the one is too brittle to endure, while the other will dry on top while the bottom is soft, a bad foundation for gold leaf or varnish.

**GLAZED TIN SIGN.**—Varnish a sheet of bright tin with damar varnish to which has been added a little good hard drying floor varnish, enough to harden the damar, but not enough to discolor it. The brighter the tin the better the effect, as the idea is to produce an imita-

tion of silver. Cut in the letters and fill in with any desired color. This makes a cheap and durable commercial sign.

**GOLD COLOR VARNISH FOR TIN SIGN.**—Take a pound of finely powdered crystals of copper acetate and place it in some warm place until it turns a pale brown, then rub it up with a little turpentine and mix with three pounds of copal varnish at a temperature of 70 deg., C. Solutions will be complete in about 15 minutes; then after standing a few days the varnish will be ready for use. Apply the varnish to the clean bright tin and let it dry in artificial heat, for the exact color depends on the drying temperature. The use of the best copal varnish will insure a very permanent gold color, and the varnish will adhere tenaciously to the tin.

**FROSTED TIN SIGNS.**—Take bright tin and make it clean. Make up a solution of two parts sulphuric acid and one part rain water, or any soft water will do. Make the tin quite warm, but not so warm that the hand cannot be held on it comfortably. With a swab, a sponge on a stick will do, coat the tin over with the acid solution; it will quickly evaporate; then wash off the tin in cold running water. If it is to remain in the natural tin color it may be dried and varnished with good clear copal varnish. The varnish may also be tinted with any transparent pigment. When dry the tin is ready for lettering.

**SHEET ZINC SIGN.**—This metal possesses the advantage of not rusting, and it is flexible, light weight, and durable. Galvanized sheet iron ranks next in desirability. The metal is particularly adapted for making drum signs, for corner display. As paint does not adhere well to zinc or galvanizing the surface may be treated with vinegar or oxalic acid, to cut its so-called grease. There is not so much difficulty with zinc as with galvanizing, though both are the same metal. Before applying the acid rub it off with fine sandpaper, say No. 1/2 or No. 1. First-coat with white lead in oil, thinned with equal parts of boiled oil and turpentine; make the surface smooth, lay it off cross-wise and length-wise, with the tips of the brush; let this dry hard, then second-coat with flat paint made from white lead darkened with lampblack to a very dense black tone. When dry, letter with oil size to lay gold or aluminum leaf; shade letters with coach black in oil and a little japan drier, making a glossy shade; then high-light with straw color. This is one of many ways of producing a good effect.

For a hurry-job, inside work, instead of white lead and black for

second coat, use drop black with a little varnish or a drop or two of oil for binder, thinning down with turpentine; quick size for lettering and clear varnish for the shading, high-lighting with medium yellow in japan.

For a vermilion background first-coat with  $\frac{1}{3}$  white lead and  $\frac{2}{3}$  red lead, thinned with boiled oil and turpentine; apply smoothly and in a thin coating. Brush marks may be avoided by laying the work off both ways. Let this dry 36 hours. Then give it a coat of English vermilion, dry, working it in rubbing varnish thin enough to apply without further thinning. When dry rub with curled hair and apply another coat of the same mixture. It is now ready to letter; if surface is too glossy or tacky rub off carefully with a little pumice powder and water, or with starch, fuller's earth or French chalk, pounced over the surface. These will prevent gold leaf from sticking to the surface outside the letters.

There is a right and wrong way to use vermilion on such work as this; most painters make the mistake of applying only the last coat with it and varnishing it to protect it. The right way is, first, to use only the best English vermilion, then to use it for each coat, including the first or priming coat. Then give a final coat of durable varnish over ground and lettering. This will usually give a job that lasts several years, the only change being a slight darkening.

Zinc signs that are to be smalted may be prepared with white lead made quite dark with lampblack, with the thinners indicated above, while the last coat is made flat, for gilding on.

**GALVANIZED IRON SIGNS.**—The galvanizing must be cut with acid, letting it dry on. Prime with red lead thinned with raw oil and a little japan drier. Apply a heavy coat but put it on smooth and even. Paint any holes and edges, to prevent rust.

**METAL BOARD SIGNS.**—The use of sheet steel boards is of rather recent date, having its origin in the great advance in the price of lumber and the delays in securing the wooden boards on time. As one expert said, any sign painter using steel boards will be reluctant to ever give it up; it has many advantages over wood. Billboards formed of galvanized steel or iron are really cheaper and more practical than the wooden boards. There is one possible trouble in making such signs, the metal may buckle. To prevent this as much as possible be careful to make your frame exactly true or square, and in nailing start in the



middle and nail both ways from there; some start at a corner and work right around the sides, but this is more apt to produce buckling.

An expert tells how he began in this branch of the business. He ordered ten sheets of 23 x 12 gauge No. 23 galvanized billboard stock; 500 lineal feet of rough 1 x 2 inch strips, 500 lineal feet of 1 x 2 inch dressed strips, and 500 feet 1/2 inch quarter-round. All this for the small swing signs, wall signs, etc. The frame was made up flat of the rough 1 x 2 stuff, and this was covered with the dressed 1 x 2 inch stuff on edge; this allowed a space for the quarter-round, covering all the nails used in fastening the sheet to the frame.

These boards may also be used for large raised letter gold signs by making holes in the sheet iron and screwing the letters on from the back. This makes it easy at any time to remove a letter for any purpose.

Making up the sheets to form large billboards and bulletin signs he found the 10-foot board the most practical for most or all occasions, the sections being made up either into two or three strips wide. The reason for making the board in sections is that it is then easy to take it down when desired to do so. Often such boards have to be removed to new locations, as we can seldom if ever have a permanent lease on a place. The 1 x 2 inch strips do equally well for the big signs as for the smaller ones, only it should be observed that instead of only one thickness of strips, as with the smaller signs, we can double the thickness by nailing them one atop of the other, filling in the spaces between. They are 2 x 2 inches in thickness. When several sections are to be made up a form can be squared on the floor and every section made according to its form, ensuring a perfect square and uniformity of shape.

Build good galvanized iron bill- and bulletin-boards, and get the best possible positions in which to place them; also secure long leases if you can.

**THE BULLETIN BOARD SIGN.**—There are several ways of putting up bulletin boards, but the main consideration is, substantiality. Use good lumber and plant the posts about four feet deep. Where there are no stones in earth a boring auger may be used, and this will bore to the required depth with speed and ease. Three feet would probably do, but as such a structure frequently has to withstand a tremendous wind pressure it is better to get the posts deep enough. Bracing also is necessary, to hold the structure. Use No. 2 shiplap boards, planed on



one side only. Lead the laps before placing. Get V-crimped painted roofing, in 10-foot lengths. If possible, lay the sheet on a cement pavement or other suitable surface and tramp it over, to flatten out the crimp. Then lay a piece of wood, 2 by 4, on the sheet and pound it with a heavy hammer, to flatten the sheet more perfectly. This will give you a sheet 26 inches wide by 10 feet long. Build the bulletin in two sections, with two or three sheets to a section, the seams running vertically. Allow one inch of each sheet to extend out on one side to lap over the next sheet or section. For a 10 by 10 foot sign use a three sheet and a two sheet section. For a metal sign the painted sheets are better than galvanized metal. Do the painting in the shop and when dry take the painted sheets out to the job. Nail on the top sheet first, and lap the next sheet over this, so that the upper edge of the second sheet will catch rain and carry it back of the sign, not allowing it to go over the front and discoloring the work. The sheets are run horizontally. For fastening the irons on the frames use 3/4 inch corrugated fasteners, Nos. 4 or 5. You will find these very useful.

**PAINTING THE BULLETIN BOARD.**—As in painting wooden boards, iron or metal boards must be properly coated with paint. Metal differs from wood, of course, so that the method of painting it is different. Make the sheets clean and then prime every part with red lead thinned with raw linseed oil. Apply paint enough to form a good solid surface. Old painted metal signs should be scraped and all loose paint removed, after which apply benzine or turpentine, or benzol, brushing it out well, after which the paint may be applied. Galvanized iron must be given an acid bath when new, same as new rolled sheet zinc. A tablespoonful of nitric or muriatic acid to the gallon of water will be strong enough, after which slightly rub with No. 2 sandpaper, to slightly abrade the surface. The best way to treat galvanizing to prepare it for paint is to use a preparation of copper chloride, copper nitrate, and sal ammoniac, two ounces of each, in a gallon of soft water. Place in an earthen vessel. Then add two ounces of hydrochloric acid. Apply with a bristle brush, and when dry it may be painted. At first the metal will be black, but this will soon change to a gray color. Diluted hydrochloric (muriatic) acid also is effective, forming with the metal muriate of zinc, which will take the paint well. On such a surface as the acid treated the paint will usually hold very

well, but it is advised to use rather sharp paint, with turpentine, and avoiding too much oil. Red lead priming is excellent, though some think equal parts of red lead and metallic brown better. If cost is a factor it would be economy to use either iron oxide or Venetian red for the priming. In any case one coat is enough on this kind of surface, unless a certain color finish is desired, when two coats may be given.

Bulletin signs are done very much the same as wall signs, as concerns style of letter and mechanical work, but white letters cut in with black are given a day for drying, instead of being cut in at once, as wall signs are. The letters and filling-in colors are quick drying, being those ground in japan, and they are thinned out with turpentine. The form of letter is the stout; the ground may be almost any color, though white letters on a black or blue ground gives a very attractive sign. A suitable border around the sign helps it, say a 2-inch stripe for a 10 by 20 foot board. And double lines, the inner one half the width of the outer one, look well. Make the border the same color as the lettering. But if two colors are used in the border then make the inner one the lighter, if the background is dark; reverse this order if the background is light. Never place two colors of the same depth of tone side by side. If there are curved lines, leaving some space, fill in with scroll work. For ordinary plain work employ a simple scroll; for more ornate lettering use a more elaborate scroll.

Cheap work, cheap paint; a white ground may be made with a compound white lead, thinned with benzine.

**SMALTED GROUND WITH RAISED WOOD LETTERS.**—Make a framework with 3 by 7/8 inch strips and crosspieces, the latter four feet apart or where the sheet iron butts end to end, and a crosspiece in between the joints. Nail the sheet iron to the frame. About a half-inch from the edge, and where the sheets meet, lay an inch strip of the iron under the joint and leave the sheets about 1/8 inch apart and nail them down to the crosspiece, about an inch apart. Now get the tinner to solder up the joint and scrape it down even with the surface, then around the edge place the usual band and moulding, and paint it well, a coat of red lead paint on the iron part first, and two coats of lead paint after that. Then screw the letters on from the back and finish up the job as desired.

The smalted surface looks better than the varnished, as the latter shows up any buckling; select sheets that are perfectly flat and free from all bends and breaks.

### HOW TO LETTER VEHICLES

THIS form of lettering is somewhat different from that employed in general sign painting. Usually the style of letter is of the rather ornate, even the plain block letter being shaded, with at times two or more colors and shades. And when a plain letter, without ornamentation, is used it is most commonly on the French Roman style. Extended



letters are frequently used in wagon lettering, though the space may be rather restricted and the lines rather irregular. As to color there is nothing like it in ordinary commercial sign lettering. Its use is free and with many beautiful combinations of colors, the effect being still further enhanced by glazing. The lettering is done with coach painters' colors, those ground in japan, and hence, as a coat of varnish goes over all the letters, all the surface of the work must be very smooth.

When a shade is used on letters the rule is to let it touch where gold, silver or aluminum is employed, making a "close shade." But if the letters are done in color there must be a little space between the letter and the shade. Gold letters on black or white ground may be shaded with almost any color but yellow. With gold letters on a colored ground use rich reds, greens, blues or umber shades. For instance, take a rich green ground, a gold letter, and a rich red shade.



Black letters look well when shaded with almost any color, especially the primary color series.

Spacing and punctuation are followed as in general sign painting. The alphabets are usually the ornamental ones, these being especially adapted for such work. Very plain letters will do on wagon work, but in general the more ornate letter looks best.

**LETTERING WAGON PANELS.**—As the panel will have the same lettering, etc., on both sides it is advisable to use the following method: Lay out the inscription in white chalk on one panel, and then take a sheet of paper—newspaper will do—and carefully but firmly press it against the lettering, using a soft cloth to press with. This will leave an impression on the paper that may then be transferred to the other panel. Use the soft rag again. This must be carefully done, of course. In case the size of the inscription is too large for one sheet of paper, register the first “pull” on paper so that another sheet may be fitted accurately for another pull, covering the remaining part. This plan will be found to save time and also insure getting both sides alike.

If several vehicles are to be done with the same inscription it is best to use a stencil. This may be done by coating a sheet of manila paper with japan black and when it is dry press it against the chalk inscription, then prick out the letters, thus forming the stencil plate.

**LETTERING DIAGONAL PANEL.**—In placing the letters on a slanting or diagonal panel the rule is, to let the slant run towards the highest point of the panel.

**FORMING SKELETON LETTERS.**—The rule in making skeleton or outline letters is to allow size of line to be on a basis of a 1/4 inch to a 6-inch letter, and 3/8 inch for a 12-inch letter. Fill the inside of the letter with any color that will harmonize with the other colors used on the job. The filling, etc., may be done in gold or color, and the skeleton outline may be fine-lined on both the inner and the outer edge.

**DECALCOMANIA LETTERS.**—These letters save little on the cost of hand-work, because of the fact that there is no standard car letters, where such letters are most useful. But where the painter is not an expert letterer the decalcomania or transfer letters are very useful. It may be true, however, that the unskilled painter may not be capable of handling such work properly, or may be too slow to make it economical. Then where there are grooves or beads to letter over



the transfers would be useless, as a rule. On such a surface the expert with lettering brush can do the job much faster than with transfers, even where they can be used at all. And where large plain letters are used, without shading or edging, and such is commonly the style with passenger car lettering, the sign painter will do it quite as rapidly as the man with his transfers. All gilded work on car lettering is done with gold, but the gold on the transfers is always imitation, a gold-color glaze over silver or aluminum leaf. Stencils may be used to some advantage where the surface is plain, and will perhaps prove better than the transfer.

Decalcomanias may be used to advantage in many places, and with economy where two or more may be transferred at the same time. They also do for certain interior work, such as water coolers, doors, etc. For small sign plates they cost less than hand work. A car painter says he did nine cars with transfers and that the entire cost was less than it would have cost for the gold leaf used in lettering the same job. But as previously stated, the transfers do not have true gold leaf.

**SOME USEFUL HINTS.**—Oil gold size should not be used when laying gold leaf on wagon work. Use a quick size, which can be made from gold size japan and quick rubbing varnish or coach finishing varnish. If you color the size add as little color as possible, just sufficient to enable you to see your work. Do not add turpentine to the size, for that will dull the luster of the gold. Also, do not apply the leaf too soon after applying the size, for that also will dull the gilding.

Don't outline the letters in sizing; finish each letter before you leave it.

When laying out your work make light-faced letters, keeping the words and letters well spaced apart, for lettering on a wagon is to be read while the vehicle is in motion, as well as when not in motion. If the letters are heavy-faced and close together the inscription will be blurred while in motion, and hence very difficult to read.

The letters may be shaded in any manner you wish, and you may use colors as brilliant as desired, but you must have regard for color, harmony, contrast, and good taste.

It is now quite the thing to not shade the letters, done in gold, but to line or edge them with a strong color that will contrast well with the ground color.

Keep the work as neat and clean as possible. Use butter-fine colors, the best there are.

Be sure that the chalk crayon you use is free from grit, or your work will be very badly injured.

### ACID-EMBOSSING BRASS SIGN PLATES

THE brass plate used for this work is of 16 gauge, or 1/16 inch thickness. One side must be polished, and on this the lettering is done. The plate must be perfectly clean and free from grease, etc. Wash in strong sal soda water, rinse in clear running water, and rub dry. The border and inscription is then traced in with the best asphaltum varnish, adding enough turpentine to make it flow easily under the pencil. This must be allowed to stand from 24 to 48 hours to become hard-dry. Keep plate and asphaltum slightly warm while doing the cutting-in with the varnish; an alcohol stove at hand, with the cup of asphaltum on it, will be a convenience; be careful of fire.

Draw your lay-out or design carefully on paper, using a lead pencil; then place a sheet of carbon paper on the brass plate, lay your design paper on that, face or inscription up, then with a hard, pointed lead pencil trace the inscription with gentle pressure, which will transfer it to the brass plate. In making the design or inscription allow plenty of margin and neither unduly spread the letters nor crowd them.

Now we are ready for the embossing process. The first thing to do is to make a 3/4 inch dam around the plate, to hold in the acid. The wax used is composed of beeswax 2/3 and rosin 1/3, or beeswax with a little asphaltum to make it more pliant. Press the wax to the plate so that it will be perfectly water tight.

Two coats of asphaltum are best on the letters, and two days for drying; a little more time and trouble with these preparations will often save time and loss in the finishing.

The embossing fluid is made by mixing together two parts nitric acid with three parts water. Some use only two parts of acid to three of water. In any case it is best to test its strength on a piece of brass before using it in the work. If the acid bubbles it is too strong; add a little water. If it does not eat fast enough add a little more acid.

Now pour the acid on to the plate to a depth of about  $1/4$  inch. Watch the process; stir the fluid now and then with a feather, to keep the acid, weak from eating the metal, with that which is strong. As soon as you think it has eaten deep enough, which can be ascertained by means of a pin, feeling the edges of the eaten letters carefully, or by carefully tipping the plate up, break away a corner of the dam and pour off the acid. If eaten deep enough wash off the plate in running water, wipe dry and remove dam and asphaltum, the latter with turpentine or benzine. The plate is ready now for filling the letters with cement.

This cement may be described by several different formulas: painters have their favorite one.

No. 1.—English patent drier in paste form, colored with dry lamp-black, for black letter; with dry English vermilion for red. Work the ingredients together with a spatula to form a stiff putty.

No. 2.—Dry white lead and powdered litharge in equal parts, with lampblack or vermilion to color; make into a stiff paste with varnish and coach japan.

No. 3.—Make up a stiff paste with dry drop black and boiled oil, with a little sugar of lead for drier.

No. 4.—Melt together equal parts of dry drop black, best asphaltum gum, hard drying body varnish, and the best coach japan.

No. 5.—Shellac varnish 50 parts, powdered chalk 40 parts, dry lamp-black 12 parts, and turpentine 10 parts; mix to a paste or putty.

No. 6.—Melt together equal parts of gutta percha and the best asphaltum gum, in an iron pot; add of pulverized shellac a quantity that will equal one-fourth the bulk of the other ingredients. Use while hot.

No 7.—Four ounces each of best asphaltum gum, orange shellac gum, and dry lampblack; pulverize the two gums, add the black, and mix all together. Melt over a slow fire, or place in the etched letters and heat the plate to melt the filling. Let the filling become cold, then pass over it a hot iron, to level the filler and make it glossy.

WHITE CEMENT FILLER.—To equal parts of the best coach japan and rubbing varnish add enough dry zinc white to form a paste or putty. Do not fill the letters quite full, leave a slight space to be filled with a coat of flake white ground in japan and thinned with



turpentine; apply with a soft hair pencil. When hard-dry polish with a soft rag by gentle rubbing.

Of all the above formulas for black letters we recommend as being the best the first two.

**LEAD FOIL METHOD.**—Make up a mixture of best asphaltum varnish 1 pint, beeswax 2 ounces, dissolved in a little Venice turpentine, and 1/2 ounce of powdered pale rosin; heat all together over a slow fire. Give the plate a stout coat of this, and when it has dried to a proper tack lay on it a sheet of lead foil, which press evenly and firmly to the plate. Pounce on the inscription, and with a needle fastened to a stick cut out the letters, raise and remove the cut-out foil. Remove the exposed size with turpentine, rub off clean, and polish the brass. A bristle brush in turpentine is good for cleaning out the letters. A metal ruler is useful for cutting out letters with, forming a guide that will make clean edges. Be careful not to raise the edges of the remaining foil. The sign is then ready for the acid. After removing the acid wash the plate clean, let it dry, and apply three or four coats of varnish-black. Let this dry; then remove the remaining foil.

**ANOTHER METHOD.**—The following method comes from the head of a sign painting school. It is worth trying for its novelty, if for no other reason. We have never tried it, nor ever heard of any other sign painter trying it. The plan is simple enough. Coat the brass plate with asphaltum varnish, let it dry, then paint in the lettering with oil paint. It is said that the oil paint will soften the asphaltum, and then the latter may be removed by rubbing; this will leave the lettering clear of asphaltum, and ready for the acid.

### *Some Notes*

Gauge is a term used in designating the thickness of the brass plate. No. 16 gauge, or 1/16 inch thickness, is that commonly used for etching brass signs on.

As the etching acid is injurious to the eyes and throat, the work should be done where there is plenty of free air, to carry off the fumes.

The acid, after using, may be kept in a bottle for use again, when it may be made strong enough by the addition of more acid. But do not pour the used acid back into the original bottle.



The wax used in making the dam may also be kept for use again.

It takes the acid from four to eight hours, as a general thing, to eat out the metal sufficiently, according to its strength. After the first hour it will require little attention.

A spirit lamp with a piece of sheet iron on it so that the flame will heat it enough to keep the mixture warm is useful when using the lettering asphaltum.

It is not necessary to use the acid if you have access to a graver and routing machine. With the graver outline the letters, and use the router for removing as much of the metal inside the outlines as you wish. This does finer work than the acid process, though it is not always available, and then the acid way is the best. In cities this work is generally sent to factories making a specialty of it.

When the cement filling has about half-dried or set you can clean the surface of the brass plate with a cloth and dry lampblack.

The letters may be coated with black baking japan, if it is desired to use the baking process. A stove oven will do if the plate is not too large. Place the plate face up on the bottom of a sheet iron pan; cover with another pan or piece of sheet iron, to exclude dust or dirt. Place in the oven and see that the oven registers 300 deg., Fahr. If, after a few hours, the black does not seem to cover solid, apply another coat of the black japan and bake again, even repeating a third time if necessary to get a strictly first-class job.

As acid does not make a rough surface it may be well to scratch it with an awl, to insure the cement or coating to hold well.

When about to use the acid, see that your plate lies level on the table; have a few small wedges to level up with.

Use the simplest formulas that will do the work satisfactorily for you; be careful to note proportions of ingredients to use, follow directions carefully, don't be impatient, take time, until you are an expert at least. Press the cement carefully into the etched parts. Use a celluloid knife, to prevent abrading the metal. Clean up plate with rag and turpentine, wash with water made slightly acid with oxalic acid, rinse in clear water, and polish with dry rag and lampblack.

Nitric acid eats brass, copper, zinc, etc. It does not affect glass. Keep it in a glass bottle with stopper. It is a highly corrosive fluid. If it gets on your flesh treat at once with lime water or baking soda; to control the pain let water then run over the burn, to remove the

soda or lime; then treat with carron oil, which is a mixture of sweet oil and lime water, equal parts. Bandage lightly. If the acid gets into the eye, apply lime water, to be followed with liquid vaseline, to allay irritation. Remain in a dark room.

### SOME PRACTICAL FOOT NOTES

IF there is to be a light tint or colored ground don't back-up with asphaltum.

Gold scrolling that is to be shaded should not be shaded with asphaltum if work is to be varnished; the asphaltum is apt to work up under the varnish.

Never apply a coat of quick-drying color to a coat of slow drying color, unless the latter has had several days for drying, and vice versa.

For filling-in letters there is nothing better than the flat hair brushes, which come in sizes from one inch to four inches wide.

Don't spare the gold leaf when working on glass, especially on small work; time is costlier than gold.

Windows of stores that are peculiarly liable to sweat, such as restaurants, etc., are uncertain about holding gilded letters. They will not stay.

Legibility is the first requirement of a business sign. No matter how handsome the sign, if not perfectly legible it is a failure.

Don't lay out a job hap-hazard, take time to plan it, and then do the work carefully.

Perfection in one style of letter is better than mediocrity in a dozen. The sign painter who bases his eminence in lettering upon his skill in many styles may claim eminence in diversity of attainments, but hardly in their artistic quality.

The letters which present the most difficulty to form are the C, G, O and S. The thing to avoid in making these is lopsidedness. For this reason it is well to draw the upper and lower curves first.

Lines under words, large initials, and external shading tend to spoil any design. It is only necessary to know that the first letter in an important word should be imperceptibly taller, wider, and stronger than the others.

All straight-line letters may be trimmed up with a blunt stick or

pencil handle. In the case of lines a double pointed stick may be used so as to trim both edges of the line at the same time.

Printers' types should be studied with caution, especially italics, which retain bad faults.

If you make a good lay-out, though your letters may not be perfect, you will get credit for a good sign, but a poor lay-out will spoil the effect of perfectly formed letters.

If accidentally you apply a piece of gold leaf to the glass too soon after sizing with water size, and it starts to slide down, rub your finger quickly on the side of your nose, then under the sliding leaf, and the leaf will stop.

When lettering on water paint grounds do not use oil colors. Use color ground in japan and thinned with benzine. Or water color with a binder of gum Arabic or glue size.

Line shading is sometimes desirable; this is done by running a dark line on the shade, adjoining the space left between the letter and the shade; this line should be a color that is two or three shades darker than the shade proper.

Letters may be shaded and blocked on top, bottom, or on either side, according to the point of view. Keep the shading color cool and transparent. Let all slanting lines from corners of letters to corners of block be at the same degree throughout the sign.

Two or three colors of bronze may be placed on a line of lettering by having as many pads, one for each color, and doing one-half or one-third of the letter with each pad.

After finishing the sign clean off the chalk marks, etc., and use a soft rag, with a drop of oil on it for a gloss, but for a flat ground use a chamois, a little damp, finishing with a clean, soft cloth.

If a board sign, paint it nice and white and make it smooth; set out the inscription with chalk, dust off the chalk when done, and cut-in or paint the ground color, vermilion or any dark color, around the letters, being careful not to have the color set too quickly; and fill up the ground with same color, using a soft flat brush, flowing the color evenly, not rubbing it out.

You can gild on glass without using alcohol in isinglass size, but more care is required in having the size fresh, especially in hot weather. The grain alcohol, however, is a good thing to use.



Spar varnish is desirable, applied over the black backing on gold leaf. Adding a third of fat oil to the varnish improves it.

To insure a good job of gilding have the size hard but with enough tack to hold the leaf. After gilding rub down carefully with absorbent cotton, then wash with perfectly clean water and clean chamois. Cold water should be used.

## LETTERING ON OIL CLOTH, CANVAS, MUSLIN, ETC.

**MUSLIN WORK.**—Muslin may be bought ready sized for sign work. Plain unsized muslin may be prepared in the shop by sizing it after tacking it up, two coats of glue or flour size making a good surface, though one coat will do on ordinary common work. Or the unsized muslin may be used. Sign for inside use may be sized with cold starch water, which will stiffen the muslin and give a good ground for lettering on; it will not stand outside exposure.

It is necessary to have a smooth, flat surface for muslin work. The shop wall is a favorite place, in lieu of which wall board may be used, attaching it to the wall.

Cut off the quantity of muslin required from the roll, and tack it along its edges, about 18 inches apart, pressing the tacks in with the thumb, but if too hard then drive them lightly with a light tack hammer; use common 5/8 blue or tinned tacks. It is a good idea to run a horizontal line along the top of the wall surface, to hang the muslin by; then take the bottom edge at the middle and pull down and tack, then stretch and tack all around. Get the muslin stretched nice and smooth. After cutting off what muslin you need for the job roll it up and put away in a drawer. Keep it clean, and smooth.

You are now ready for the lettering. If the sign is rather long you can run horizontal lines with a line filled with charcoal, snapping the line in the usual manner. The letters should be lightly sketched in with a charcoal crayon, so that the marks may easily be removed with a feather duster or whisking a light cloth over the work; space and make the letters neatly, then begin the lettering.

Fresh made color is best; do not mix more than enough for the job, or for the day, if much is to be done. Use dry pigments and mix



with varnish or gold size to form a paste, which is to be thinned out with benzine; color ground stiff in oil also may be used. With black it is best to use gold size, as varnish does not dry this pigment sufficiently.

On large letters you may run the outlines with a lining fitch and fill in with a No. 11 or 12 flat or round fitch. A flat camel hair brush is a good lettering tool. For cheap work, which means quick work, use the one-stroke brush on letters whose size will suit such a brush; the idea is to make a member of a letter with one stroke of the brush. This of course cannot be done on large letters.

The lettering color may be mixed and thinned according to require-



ments; for black, one part, thin with gold size two parts, turpentine three parts, and boiled oil a little less than one part. Most other pigments may be mixed with boiled oil two parts, gold size two parts, turpentine five parts, and pigment one part.

Useful colors will be found in permanent red, ultramarine blue, medium chrome yellow, and tints made from Prussian blue, lemon chrome, and white lead. As dry ultramarine blue does not dry well the addition of some Prussian blue, say about one-third, will help it; if this makes it too dark you may add a little white lead. Mix with varnish and benzine, adding a little boiled oil to the varnish and mix with it before adding to the color; do not use too much benzine, as

it will weaken the binders. Aniline reds and blues will run in the rain, hence for outside muslin signs it is better to use English vermilion, though it costs more. Plenty of varnish will make any color more durable on this kind of work.

In laying out the sign avoid making too many straight lines; break this by running a curved line when possible. The most important words may be put in large, bold letters, on straight and curved lines, with a scroll or two by way of embellishment. Surround these with light shades of color. Some signs must necessarily be done in straight lines.

If you are going to letter on unsized muslin then draw it tight on the board and use a paint containing neither oil nor turpentine, which will spread the color beyond the letters, or cause a halo of oil that will deface the sign. The old time way was to wet the muslin, which prevented the halo effect, but that was when it was not known that mixing without oil or turpentine would prevent the halo; benzine was not in use then or known. However, the sized muslin is so much easier to letter on that it is economy to use it, in time saved. Some thin with three parts damar varnish and two parts benzine. Most sign painters, when using the wet muslin, allow it to stand after wetting for 15 to 20 minutes before lettering; then if too wet they remove excess moisture with a dry rag. The muslin must be quite damp, though not wet. If too wet there will likely be gray spots in the letters; to remedy touch them up when the paint is half-dry. Another thinning medium used by some is composed of japan  $\frac{2}{3}$ , oil color  $\frac{1}{3}$ , thinning with turpentine.

Bright colors make a very attractive muslin sign, though as a general thing only black letters on the white ground are used. Bright red and blue are favorite colors. To cheapen the cost of English vermilion add to it twice its bulk of the best whiting, previously grinding the whiting on a slab, in turpentine. Mix the vermilion with gold size japan, then add and mix with it the whiting mass. This adulteration does not seriously affect the red color, but it will make it more durable than a cheap red, while the shade of red that it will yield will be pleasing. We have seen a sign where the initials of each word was done with a cheap red, the rest of the letters being in black. In a short time the red faded out, leaving a sign that looked like this:

HIS BUILDING AND  
NOT OR ALE  
INQUIRE WITHIN

Dark blues, greens, reds, and browns give strong effects in muslin sign work, and canary yellow, lemon yellow, and very light shades of blue, green, and gray make the best shading colors. For the high lights use white, chrome yellow and golden ochre. As muslin signs are for the purpose of advertising, and mostly of a temporary nature, it is advised to employ plenty of contrasts and pure colors. It is a good rule never to entirely hide the white ground. The following will explain this: A sign that is to be done with black letters and red capitals on a green ground may be lettered as usual, and then paint in the green ground, but leave a margin of pure white one-half inch wide. If the ground is to be black, red, or any other dark color, with a green letter, leave a half-inch white outline. Neither light tints or dark colors must touch one another, but be divided always with white.

A water color may be used on outside muslin work, and it works freely and stands exposure very well. In a clean vessel boil one quart of water, and add to it while boiling four ounces of shredded beeswax and let the water boil until the wax has melted. In another vessel have a pint of boiling water and add to it one ounce of shredded white soap; when it has melted mix the wax and soap solutions together and place on the fire and let it boil a few minutes. Next prepare a mixture of white glue or gelatin, two ounces, in one pint of hot water; add to the first solution by stirring. When ready to use it add bichromate of potash, at the rate of 10 drops to the pint of solution; this will harden the liquid and make it weather-proof. Use at once and do not try to save any, as it hardens in the vessel.

Any desired water color may be added, but if the ground is to be white use no coloring.

To letter a muslin sign on both sides, either do two signs and sew them back to back, or coat the one muslin so that the lettering will not strike through. Such signs are made to swing and to be read on two sides.

**PAINTING A PICTURE ON MUSLIN.**—Use the best muslin and stretch it on a frame. Sketch in the picture with charcoal and then



dust it off. Dampen the surface with glue size, and when dry paint in the entire picture with solid colors, viz.: Sky, blue or gray; foliage, light green; trees, umbers and light brown; figures in flesh tints; garments in suitable colors; animals or reptiles in colors, at all times preserving your drawing. When these local colors and tints are dry over-work on this foundation with the shading color and high-lighting, bringing out the picture in all its details, using such coloring as may be found necessary.

All colors should be those ground in oil, thinned down with benzine and adding a little driers; make the color rather thin. One color works over another very nicely. The method advised insures a flat surface or finish, and it will not crack when rolled; it is the method used by the best painters.

For speed the cut-in lettering excels. That is, instead of painting in the letters, paint around them, leaving the letter in the white muslin. Or the ground can first be painted any desired tint or color, then the letters be cut-in. The block letter is the one for this work, as it requires the least time. Also panels and ribbons may be used in connection with the lettering, in which to place the smaller lettering. It is advisable always to leave a margin around the sign, say two or three inches, both for appearance and for convenience in tacking to the frame.

In muslin sign work it is handy to have templates cut out of cardboard for circles, ovals, diamonds, shields and ribbon ends. If there are to be several such signs made, with ribbons and panels containing small lettering, it will be well to make a stencil plate of the lettering.

After your muslin sign is dry, roll it up; do not fold it, which will cause creasing.

If you have several muslin signs of the same kind to do, simply leave the first sign on the wall until dry, then place your next muslin on it, and the inscription will show through, providing the muslin is not too heavy. But the horizontal lines should be snapped as in the first case.

**LETTERING ON CANVAS.**—Stretch the canvas on a frame or on a smooth wall, getting a perfectly tight and smooth surface. Make up a size with four ounces of glue to the gallon of water, adding a half-ounce of powdered alum, and give the canvas two coats. Use hot size, and let the first coat dry before applying the next. When both coats are dry take fine sandpaper and lightly rub off the nibs. It is really



best to give the first coat of size 24 hours for drying, and the second coat ample time also. Mix lampblack ground in japan with some quick drying varnish, thinning out with turpentine; use the color as stout as you can work it.

**SOAPSTONE SIZE FOR CANVAS.**—Make a stiff flour paste and thin it out with water so that it will work easily under the brush, then mix in some steatite or soapstone, powdered, using your judgment as to amount; cheesecloth requires the most and heavy canvas the least. It is a matter of texture. For common muslin use about a tablespoonful of soapstone to the pint of paste. Apply it with a stiff bristle brush, a wall brush being best, though a round one will do. This according to the extent of area to be coated. Or the paste may be applied with a paddle made from a cigar box lid, rounded off on its edges so that it will not make edge lines on the work; thin the edges down sharp and give it a coat of shellac. The flour paste must be free from lumps, making the whole mixture perfectly smooth. This size or grounding is intended for muslin, canvas, duck or cheesecloth.

**PREPARING CANVAS FOR ROLLING UP.**—Dissolve white beeswax in turpentine in the cold, which will require about three days; when done it must be like soft soap in consistency. To  $3/4$  lb. of this add 2 lbs. zinc white, ground in oil, and two tablespoonfuls of soft soap; this will make a thick mass, to which must be added a little japan drier. Apply the mixture to the canvas with a spatula, filling the texture full and removing the surplus. After it has dried, thin some of it to a brushing consistency with equal parts of boiled oil and turpentine; give it a good coat, and if it does not fill the texture perfectly give it a second coat. When it is dry the canvas may be painted or lettered in the usual way.

**ANOTHER METHOD.**—Melt an ounce of soft soap in 30 fluid ounces of water by boiling; then stir in one quart of boiled oil, and when cool stir in five ounces of gold size.

**HALO AROUND LETTERS ON CANVAS.**—The effect of using oil on canvas is the same as on muslin, hence the lettering should be done with benzine-thinned color. To correct a halo or oily effect around the letters run an outline around them with gelatine size to a little more than cover the halo stain; when it is dry take the color that the letters were done in and trace the sized part in, keeping a very slight bit within the sized part.

**LETTERING ON CANVAS AWNING.**—There are two main parts of a canvas awning, that which is stationary, and that which is not, but that is rolled up as required from time to time. The method of lettering depends upon these two conditions, and also upon the character of the goods, whether light or heavy weight. The part that is to be rolled up must first be sized with a thick gelatine size, to which is added a little glycerin, to make it more pliable. The part that is to remain stationary must be sized with glue and soap. Dissolve 8 oz. of best white glue in enough boiling water to cover it; melt in another vessel 4 oz. yellow soap, in hot water, then mix the two solutions together; size the canvas with this. Thin out oil color to a semi-paste with turpentine and drying japan; this is for the letters on the stationary part. For the part that is to be rolled up make the lettering color rather oily, and use less japan. For quick work use a good elastic varnish instead of oil for thinning with. Give the different coatings plenty of time for drying, and the same for the lettering. For cheap, quick work use japan lamp-black thinned with benzine; this will dry almost as fast as you can do the letters. For the best grade of work use the best lampblack in oil, thinned with a mixture of best japan driers and turpentine, or with hard oil and turpentine. Either of these will work on dry canvas. For very durable work use lampblack in oil thinned with boiled oil, and no japan, and as little turpentine as possible. With this latter method the canvas must be made damp and lettered while damp. Such lettering will last as long as the canvas. If the letters are to be done in colors, red, blue, green, etc., a dry surface requires the lettering color to be thinned out with a mixture of quick varnish and turpentine or benzine. To letter on a damp surface thin with boiled oil and turpentine. For white lettering use white lead in oil thinned with varnish and turpentine for the first coat, and to make a very white surfaced letter use a mixture of white lead and zinc white, or the latter alone; or two coats of pure white lead. Thin with turpentine only.

**LETTERING CANVAS COVERED TRUNK.**—Dissolve 4 oz. glue in one gallon of water and add to it one-half ounce of pulverized alum; apply this size hot. Any good paint mixed with raw oil with about a tablespoonful of gold size or good japan drier to the gallon of paint will do; mix the paint rather stiff and rub it well into the canvas. The sizing should have about 24 hours for drying. A second coat of paint will

make a better job, but this will be according to the price. When done and dry the lettering may be put on.

RE-LETTERING OVER A NAME.—If you should have an awning to re-letter, the old letters being in black, the easiest way to do is to make a black panel on the old name, using lampblack ground in japan and thinned with benzine. This will dry in about one hour, and then you can letter with gray or white. A gray letter made with a quick drying color will most likely cover in the one coat, by finishing with a broad white high-light stripe, using both the gray and the white as heavy as possible.

LETTERING ON SHADE CLOTH.—Stretch the shade cloth on a frame, gluing the edges to the frame. Apply a coat of medium strong glue size and let it dry. Mix and apply a paint of the desired color, using white lead and oil coloring, thinned with  $\frac{1}{4}$  boiled oil and  $\frac{3}{4}$  turpentine, mixed. Strain and apply with a broad flat brush. The paint is very thin, more like a wash. One coat of paint on each side of the cloth is all that is necessary. When the cloth is dry it is cut from the frame, hence when you stretch the cloth remember to leave ample margin to allow for this cutting; say four to six inches.

LETTERING WAGON UMBRELLAS.—Make up a strong solution of soap and water—4 oz. soap to the gallon of water. Wet the cloth with this and letter on it at once. Or paint the cloth if it is desired, and letter on it. The paint is made of equal parts of boiled oil and turpentine, which will leave the cloth flexible and give a good ground for the lettering. Mix the lettering color with the turpentine-boiled oil mixture, adding a little gold size japan or any good drier.

TO LETTER ON BILLIARD CLOTH.—Stretch the cloth on the floor, if no other suitable place can be found, and trace in the letters with shellac; also any other work that is to go on the cloth. Small letters may be stencilled on with the orange shellac; then paint in the letters with white lead thinned with gold size japan; then the letters may be colored in parts or gilded, as desired.

LETTERING ON OIL CLOTH.—First give the oil cloth a size with benzine, which will remove the gloss and allow the oil color lettering to remain without creeping. Some use a sponge dampened with vinegar, which is very good. Turpentine will do, but wood alcohol, advised by one man, will surely cut the surface too much. There is on the market a painted cloth that requires no sizing, as the letters will not creep or



ciss on it. The lettering may be done with a color in oil and having a consistency like thick cream, which may be thinned out to a suitable consistency for lettering. An oil cloth sign intended to stand exposure to the weather, the letters to be gilded, may be sized with varnish and gold size japan mixed for the letters. To letter on enamelled drill or oil cloth mix the color with equal parts of raw oil and japan gold size, thinning out with turpentine.

To make a smalted oil cloth sign get the dull finish cloth, but if you cannot, then take the common cloth and remove its gloss with benzine or water and whiting. The smalting is the same as for a wooden sign board. Take your time on the job; don't rush it, for if you make it dry too fast the color will likely scale. Use very fine sand.

LETTERING ON LEATHER AND IMITATION LEATHER.—Such as suit cases, etc. Ox gall is a good size for removing the gloss, and it may be had of the druggist. Add to a little water. Usually India ink is used for the lettering, hence the lettering surface must be without gloss. There are a great many different kinds of finishes to these leathers. For oil finish leather use a color mixed with oil and a little varnish for binder, rubbing varnish being best; add also a little japan drier. For a better job second coat and allow plenty of time between coats for drying. For uncolored or tan leather, used on hand bags, suit cases and trunks, use japan color thinned with a mixture of varnish and turpentine, so that the color will not spread, or soil the leather. On patent or enamelled leather use dry color rubbed up with rubbing varnish and thinned out with turpentine. To gild on oil finished leather and uncolored tan leather the parts to be gilded must first be shellacked, then size with oil size for slow work, or japan gold size for quick work or for three to four hours. The same for silver leaf. Enamelled leather requires no shellac, but add japan to the size to make it show on the leather. For dark leather use light color, and for light leather use dark color. These directions apply only to the lettering, not to the coating for the whole surface, which would have to be done in a different manner.

TO PREVENT CRACKING OF PAINT ON CLOTH BANNER.—Sometimes the paint on a picture on a canvas outdoors sign will crack off before the goods is worn out. To prevent this stretch the cloth on the frame, draw in the design with charcoal, then go over the drawing with burnt umber mixed with quick varnish or japan, this fixing the drawing. Mix



the color with equal parts of boiled oil and turpentine. Make a strong suds with white soap and water and wet the goods with it. Apply the paint while the goods is still wet and rub it in well, so that one coat will do. For the finishing the colors are mixed as described above with the addition of a very little japan drier.

**PAINTING A SILK BANNER.**—Outline the ground for the picture with a quick-drying varnish color, mixing to a stiff paste with equal parts of turpentine and oil, and thinning with strong soap suds, applied at once and while hot. If the silk is not well filled after becoming dry, apply a second coat, using the same paint but made thinner. This will make a smooth, flexible ground on which the picture may be painted with very thin colors.

**HANGING BANNER ACROSS STREET.**—A large banner or streamer, 3 by 36 feet, when hung across a street is subject to an immense strain owing to heavy winds and storms, and though it is carefully made and secured it often tears loose from its fastenings. One means for guarding against this accident is the placing of openings in the banner, which allows the wind to pass through and so reducing the wind pressure. Here are two methods used in hanging such signs. Use canvas or duck, muslin not being strong enough. After you have finished the lettering get a lot of small harness snaps and rivet them with small pieces of leather to the top edge of the banner, about a foot apart. At the two top corners of the banner have a triangular piece of leather sewed on, and in the leather have holes for tying small ropes to. Then take slats 7/8 by 1/2 inch and nail to the back of the sign in a vertical direction, using small lath nails and tin washers. Now hang a length of No. 9 wire across the street to attach the banner to. Tie a small rope to leather so that a man can pull the sign to the middle of the street, while another man is feeding out the banner to the wire. Then tie the small rope to the building, loosely, to allow for shrinkage in rain. A banner sign hung after this manner will remain straight and smooth.

**ANOTHER METHOD.**—For a banner 36 by 3 feet use two thicknesses of 20-inch drilling, making four lengths of the goods; double-sew the goods, with a lap of about 3/4 inch. Hem at top, bottom and ends. Through top and bottom hems run a 5/8 manilla line, sewing it to the hem so that sign cannot slip on the line. Also sew a rope into the hems at each end. The lines at top and bottom should be long enough to make the fastenings to the poles that are to carry the sign

so as to take as much of the strain off the banner as possible. In hanging the banner draw the top line much tighter than the bottom line, thereby allowing the top line to bear the weight of the sign. The bottom line being left loose enough to allow the sign to swing 30 deg., either way, which should allow an ordinary wind to pass safely under it. If holes have been cut in the goods to allow the wind to pass through, stitch around the holes so that goods will not ravel. It may be that a  $\frac{5}{8}$  inch line will not be strong enough, so that it may be as well to use a  $\frac{3}{4}$  inch line for the top and a  $\frac{5}{8}$  inch line for the bottom.

**PAINTING A TRANSPARENCY SIGN.**—The muslin used for this sign must be fine, white linen being the best for the purpose. The muslin must be sized with white gelatine size, after being placed on a stretcher, and after it is dry it is re-stretched on the frame and given another coat of size. Some experts put the muslin in the size and wring it out, saving time and trouble, then they stretch it. Try your size on a piece of the muslin, to see if it is of the right strength; also try your colors before using them. Transparent pigments, such as raw and burnt sienna, Prussian blue, any of the red or purple lakes, Vandyke brown, and burnt umber for the shadows, are used in this work, thinning with turpentine; the colors used are the same as those used in landscape painting, which are in oil. Add a little varnish for binder. To make the muslin proof against the weather size the goods with a size made from one ounce of beeswax dissolved in one quart of turpentine; apply while quite warm, using a bristle brush. For white work in general the following size will do: Slake a small piece of fresh lime in hot water and add skim milk until the lime is quite thin, then strain through double cheesecloth; color as desired.

The design is first drawn on paper of the size the inscription is to be, which is then pinned to the back of the muslin; placed in the light, as near a window, the pattern will show through the muslin and may be traced therefrom onto the front, using a soft lead pencil. But if the light is poor, or you cannot see the design through the muslin, then make a pounce pattern and pounce it on.

For outlining the design use japan color thinned with gold size japan or quick varnish, thinning out with turpentine. If the muslin is well sized the colors will not run. The outlines should be bold and strong. Pounce with powdered charcoal.

A good effect may be obtained by placing one transparency behind

the other; on the front is painted all that is required to be seen, in the clearest relief; the painting on the other transparency is modified in its effect by the painting on the front.

**TO PAINT AN ADVERTISING DROP CURTAIN.**—Use unbleached Indian Head muslin, sewed on the selvedge, with seams running in a vertical direction. Stretch the muslin tight on a frame, then size it; mix whiting with water to form a thick mass and thin it out with hot glue size to proper size consistency. The size must be rather weak. Apply it hot, using a broad bristle brush, and fill the texture of the goods. When the size is dry sketch in the design with willow charcoal pencil, sharpened as you would a chalk crayon, by cutting from the point upwards, using a sharp knife. Willow charcoal brushes off readily. Leave plenty of margin at top and bottom, for the hanging batten and the roller. A slightly roughish surface on the muslin is better than a smooth one, as it lights up more effectively than the latter. At night, under the brilliant illumination of a theater, flat colors give the best effect, only certain parts of the curtain being finished in gloss. Then, some colors look different when seen under artificial light, especially the blues, greens and yellows. As some dry colors are hard to mix with water, they should be broken up in alcohol first. Among the hardest to break up in water are lampblack and vermilion. And also, as all water colors look different after being made wet, particularly the mixed tints such as grays, purple, light blues, pinks, etc., it is better to try a color out on a piece of board or cloth, letting it dry, this showing you just how the color will look on the finished job. For brushes use hog hair bristle fitches, of sizes best suited for the work. In doing the border of the curtain an imitation gold picture frame effect will set it off fine. The dividing line between the advertisements may be imitation half-rounds showing miter corners at the joints.

**PAINTING ON BUNTING.**—Stretch the bunting very tight on a frame, and sketch in the design with a sharp pointed charcoal pencil. Dampen the goods with water, then with a varnish color, black, maroon, ultramarine blue or burnt umber, go over the outlines of the sketch while the goods is still damp. After this outlining is dry, and not until then, again dampen the bunting and with a broad fitch paint in each block or space whatever is to remain there. For leaves wash over the outline that shows in that form; with emerald green, almost



transparent, shade or deepen the hue of the green with verdigris. Use the reds, blues, yellows, etc., in the same manner. For the reds use lake or rose madder, as vermilion is too heavy. If the colors upon drying seem too faint go over them again in the same manner, always having the bunting well dampened, otherwise the colors are liable to spread. Emblematic work is usually painted on the white strip of a flag, and it will be found nearly as clear on the other side of the bunting, requiring simply a slight touching up in a few places.

Use hog bristle fitches, large and small, according to the nature of the work.

In painting the border of a curtain an imitation of a gold picture frame makes a very effective design.

For lettering on prepared sign cloth the best brushes to use are flat ox hair, and red or black sable; the same on smooth bleached sheeting. For lettering or painting on unbleached sheeting, drilling or heavier goods good hog bristle flat brushes or fitches are best.

If you have a hurry-up job to do mix dry color in shellac and you can deliver the sign in a few minutes, if necessary.

Wash the brushes out in alcohol when done with them.

Better stretch the muslin on a frame, rather than on the shop wall; in the latter case the color from the lettering may smirch the wall and so mar the back of the muslin.

To make black lettering color place the black in a cup and cover it with benzine; then add boiled oil and japan to a working consistency. The benzine makes the paint cover well and the paint will not run as it does when mixed with turpentine.

A good glue size may be made with 8 ounces of good white glue and soak it 4 hours in a pint of cold water. Dissolve 2 ounces of powdered alum in a pint of hot water. Pour the water off the glue and add to it the alum solution. A little white soap added in solution will make the size more elastic. Thin out with hot water if too thick for applying.

Another good way to mix color for lettering on muslin is by making a paste of the color with varnish and thinning out with turpentine on muslin, according to whether the muslin is or is not sized.

For water color work mix dry color with glue size, which must be hot. Mix it smooth and apply while hot or quite warm.

Muslin may be water-proofed by soaking it in a fresh lime wash,

thinned with equal parts of water and skim milk. Stir the lime and dip the muslin in, then wring it out and hang it up to dry. For better work size with paraffin or wax, thinned with turpentine or benzine.

If you happen to get too thick a starch size on the muslin go ahead and letter on it, and when done and dry you can wash out the surplus starch.

Color for lettering on oil cloth or enamelled drill should be mixed with equal parts of japan gold size and raw oil, thinning out a little with turpentine.

Muslin comes ready sized for lettering, but cheap work may be done in the old way, wetting it and lettering with oil color.

When color creeps on oil cloth dampen the cloth with water, or apply a coat of vinegar or benzine. Color will not creep on painted oil cloth, only on the varnished kind.

For cheap muslin work letter with dry color mixed with benzine and a little japan drier.

Muslin may be sized with either paste or glue size. Wax size for exterior muslin signs may be made with one ounce of wax to one quart of turpentine. Two ounces of wax may also be used.

To paint muslin signs that will dry in an hour, use only dry colors of the best grade; grind the color in japan or furniture varnish and make it a rather stiff paste; thin with benzine or gasoline until of the proper working consistency. It should work freely under the brush and not spread. Such signs will last for 30 days, exposed to the weather. If you wish them to stand for two or three months mix a little boiled oil with the color.

The brush for this work is the one-stroke, sign painters' ox hair or sable brush. The black sable is generally preferred.

HOW TO CHARGE FOR MUSLIN, ETC., SIGN WORK.—Prices should be such as will meet all expenses incident to the work, including overhead, and net a profit of about 50 per cent. Maybe less would be sufficient, for much depends upon conditions or the man and his trade. The printer has a system that calls for the addition of 50 per cent. to the net cost of the stock as "job cost," this covering actual cost of goods used and cost also of getting the goods into the shop, etc. Then there is the stock on hand, representing money lying idle, for which interest ought to be charged; there is also fire insurance on stock and shop,

etc. All of which may be included under the item of overhead expenses. Here is how an expert sign painter puts it:

To gross cost of materials add one-half of same as the job cost of stock, and to this add full cost of time and labor on the job. Add say 30 per cent. overhead charges, as rent, interest, telephone, water, light, etc. Then you have gross cost of the job, then add the 30—50 per cent. of this, and you have your profit.

Now as to charging for doing a sign, for the mere work, or per foot, etc., this also depends upon man, shop, location, etc. But we can give a good rule for charges. You must understand that while the rule of charging by the square foot is general, it is not always to be closely followed. For example, a sign 12 x 3 feet contains 36 square feet of surface, and should not contain more than a certain amount of lettering to justify the price charged per square foot. It is a good safe rule to base the price upon one lineal foot of lettering for each square foot of surface. For lettering in excess of this amount make an increase of 8c per foot; and when the lettering is less deduct 8c per foot.

You will discover in time that the greatest expense in getting out muslin signs is in the "get ready" cost, and in fact this applies to all kinds of sign work. After you get down to the work you may be able to run off 50 feet per hour, on muslin, whereas, the next 50 feet may not require nor take you more than half that time.

The increase and decrease plan noted above should be governed by the prices for the particular size of sign. The larger the sign the lower the cost per foot, and the smaller the sign the larger the price per foot.

## SILK AND SATIN BANNER PAINTING

**THE LARGE SILK BANNER.**—Make stout wooden frame, about two or two-and-one-half inches thick; the corners must be made as in frames for stretching canvas on, allowing of wedges for taking up the slack. But no cross-bar is used. Along each edge of the silk sew a narrow band of material, 2 or 2 1/2 inches will be wide enough. This is to drive tacks into when attaching the silk to the frame; it must be a material much stronger than silk, in order to hold. Lay a clean cloth on the floor, and lay frame and silk on that, to keep the silk clean.



Stretch the silk, beginning at the middle of each of the four sides, finishing at the corners. Place tacks  $\frac{1}{2}$  inch apart, draw the silk as tight as possible; the frame may then be raised up, against the wall. Or the frame may be supported by poles, which must be pulled tight, they resting against the ceiling; this is necessary in order to steady them. The poles or props allow the banner to be tilted over a little at the top, to protect the fabric from any chance drop of paint. Make the silk still tighter, if possible, by means of the wedges at the corners.

**POUNCING THE DESIGN.**—The design having been prepared by pricking it, pounce it on to the silk, using whiting with which mix a little fine pumicestone powder, so that the marks may easily be brushed away. Be careful not to get the pouncing too strong, as it is liable to be fixed when you apply the size, and so interfere with the painted work. A pounce the size of the banner would be too large to manage, hence it is in separate parts. The center has only the outline pricked, as usually the picture in the center contains a great variety of objects, and is so pictorially painted that pouncing is impossible. So that it needs must be sketched in with charcoal, and partly drawn with the brush.

**THE PAINTING.**—Only oil paint can be used in banner painting, as turpentine thinning takes the shine out of the work, besides making a paint too brittle for the purpose. And care must be observed not to allow a drop of oil to get on the silk, or paint, the oil making a dark spot that cannot be removed. But such an accident not infrequently occurs. To remove the oil spot means to either make the place more visible, or to cover it up with something. So serious is the matter of oil getting on the fabric that in some cases it has destroyed the entire banner. It has occurred that when some oil got over the size and onto the silk, it spread until it went clear across the banner; it showed a dark line, which spoiled the entire work. To guard against this evil size the outline of all painted work before the paint is applied, the outline to go only about  $\frac{1}{4}$  inch beyond where the paint is to go. The reason for sizing the outline only where practicable is because size causes stiffness in the silk. Use parchment size, applied hot and strong; the first coat may be diluted a little, but the second coat must be as strong as it can be worked. The dilution of the first coat is to allow it to flow easier.

The larger space in the center of the banner, to contain the principal pictures, after being well sized along the outer edge, is always given

a coat of white lead paint, in oil; use it thin, and rub it out well. While zinc white gives a purer white, it is too brittle, hence white lead is used. If the banner will never need to be rolled up then zinc white may be used. Tutil, the painter, used to give the center of the banner, previous to the application of paint, a coat of rubber solution, to get greater elasticity and cause the paint to bear out with a better gloss.

**THE ORNAMENT.**—The decoration on a banner is usually seen only when on the move, so that it should be large in contour and bold and simple in the painting. As the light while it is being carried strikes through the silk, and not through the painting, the ornament should be of the same shape on both sides of the banner, registering exactly. It may, however, be differently treated in detail and cutting up. As it is also necessary that the ornament should be as brilliant as possible, it is usually first silvered. To save labor the filling-up and gold sizing is done in one coat. The size is made from fat oil and white lead, nothing more, and it is applied on both sides of the frames, and silvered when ready, which is in about 12 hours. Then it is at once sized with weak parchment water size. When this is dry it is ready to be cut up with dilute Vandyke brown. This being dry, the shading is done with graduated washes of raw umber. Again dry, the reflected lights are washed in raw umber. Other colors may be used, according to the taste and skill of the painter, or to agree and harmonize with the whole coloring of the banner, usually a strong red or blue. The lettering is generally done in plain drop black work.

**STENCIL, POUNCE AND SIZE FOR SILK BANNER.**—The design is first drawn in full size on paper. This drawing may then be used to pounce with, or for tracing the design on the silk. In the former way you prick a series of dots completely around the outlines, and with a white powder, preferably French chalk, tied in muslin, pounce the pattern. To trace the design rub the back of the paper with chalk or Indian red, according to whether the ground is light or dark; place it against the silk and go over all the outlines with a sharp pointed hard lead pencil or other suitable tool. Before you commence painting fill in all parts that are to be covered with paint (1) with thin water size, (2) distemper made with size and Chinese white with a little glycerine to prevent cracking, or, (3) a coat of flat color made of white lead, varnish and turpentine. This preparatory coating should be taken to the extreme edge of the design; it is intended to prevent the oil colors from spreading;

the size minimizes the destructive action of oil paint on the fabric; coarser material should also be treated with size preparation as described.

**SIZE FOR BANNER WORK.**—A gelatine size may be made as follows: In one pint of hot water dissolve two ounces of pure gelatine, strain and apply hot. Some size the material all over, but perhaps this is not the best way. When the size is dry apply a coat of white paint to the sized parts, leaving about  $1/16$  inch of the sized parts unpainted. When the white paint is dry, it will be ready for the lettering, picture or gilding. For a size some prefer coach japan thinned with turpentine. Egg size, liked by some, and adapted for certain kinds of work, may be made by adding equal parts of white of egg and water, mixed well together. You can gild on this, or apply oil size. Oil size must be kept back from the unsized parts of the silk, as previously directed. To use Russian isinglass size, first stretch the material over the frame, then apply alum water all over it. When this is dry apply Russian isinglass size, a piece the size of a silver half-dollar to a quart of water, and boil until dissolved. Strain and apply. When dry draw or stencil on the design and paint with either water color or oil colors.

**ANOTHER METHOD FOR BANNER WORK.**—Stretch on a frame and pounce in the pattern, cutting in the letters, etc., with shellac or japan, which will not spread on the goods. Make the edges perfectly true. For gilding use oil size on the shellac ground, being careful to not let the size get too near the edges. Put on the gold leaf in the usual manner and smooth it out with jewelers' cotton. If the letters are to be shaded, or the design, do it first. If to be high-lighted, do it on parts opposite to the shading.

If you wish to have an extended shade on the letters take the color used for the foundation for the letters and shade with that, and put in the desired colors on that when dry. If no shade is desired, and only an edge line, mix the edging color the same way as the foundation color was mixed. When shading scrolls, flowers and ornaments use tube colors, in oil, thinning with benzine only. Some of the oil should first be removed from the color by placing it on blotter paper. In shading these things use asphaltum and a little carmine, or Vandyke brown mixed with a good quick rubbing varnish, making a thin glazing, and going over it two or more times to get deeper relief effects. Use camel hair brush.



In preparing panel work on silk cut in the edge of the panel with the foundation color, and fill in the panel with color mixed with equal parts of oil and turpentine; this should be thin, yet have body enough to make a good base for the color the panel is to be. Lettering on panels should be done on the finished panel color; to prevent sticking of leaf where not wanted size with white of egg thinned down with water.

The banner finally done and dry, say a few days after finishing the painting, etc., the trimmings may be sewed on, and it may be fastened to the pole; be very careful in rolling it up. To keep the paint from sticking it is well to insert a hard surfaced paper with the banner and roll up with it. When not in use the banner should be kept in a box.

**MAKING CAMPAIGN BANNERS.**—These banners run from 20 by 30 feet up to 30 by 40 feet, hence their making requires a large room. But the most commonly used size is the smaller one, yet a room at least 50 feet long is necessary. Then a table, at least 40 feet long by at least 42 inches wide, is required, made with matched boards, tightly put together, and made level and smooth. The legs for the back of the table are to be 40 inches high, while those in front are only 30 inches high, this elevating the back and making the work on it easier. On this table the strips of canvas are laid, for the lettering. Then frames for the portrait and center-piece have to be made, from lumber 1 1/4 inches thick by 5 inches wide; make also a frame 24 by 7 1/2 feet to accommodate a center-piece for the largest banners; this frame may be made smaller for smaller work.

For a banner 24 by 30 feet get muslin 2 1/4 yards wide to form the center-piece, which is about 21 feet long by 6 1/2 feet wide. This is to hold the pictures of the candidates and the embellishments. Strips for the names of the candidates require 18 yards of 1 3/4 yard-wide muslin. Use canvas or duck, where muslin is not strong enough.

Lay the muslin or canvas on the table and make it fast with tacks; then wet it well and let it tighten and partly dry out; sketch in your design with charcoal, leaving spaces for the portraits, then begin the painting. Use oil colors thinned with benzine and add a little driers; never use turpentine. This painting is done on the bare cloth in order to avoid making the banner heavy. It will require some practise to apply this kind of color to such a ground, as the paints dry out quicker and different than when used on a painted surface. After finishing

the work outside of the portraits begin them. Get a good portrait of each candidate and scale it by one-half inches; say the photo is cabinet size or 5 by 7 inches, divided into half-inch squares; that will make 10 squares across and 14 squares in length. Say the space of the center piece is 4 feet wide by 6 1/2 feet high. Divide this space by forming ten squares across, while the height will form a little over 15 squares. Now, by copying each part of the photo as seen in the unit squares and sketching in on the banner space you will easily have a very fair likeness of the person whose photo you are transferring. A good plan, where you will have several of these banners to make is to draw the photo on stout paper and then perforate the lines with a wheel and pounce the pattern on to the fabric. This will save considerable time.

The background of a portrait is important; gold bronze is a good one; dust it on a quick size. Raw sienna or old gold grounds are also good ones. Bright red shaded on one side to a rich maroon, and subdued greens, are also effective colors.

The painting of the centerpiece, etc., requires a common kitchen table covered with sheet zinc. An expert has suggested that the dry colors used be kept in what he calls a trough, taking 10 pieces of board 6 inches wide and nailing them together at right angles, the strips being ten feet long. Put a square block at each end so that it will stand up on the table. Make a series of small compartments, one for each color. The colors are green, blue, burnt sienna, Indian red, Venetian red, Vandyke brown, yellow, carmine, or deep rich red; aniline red is better than pure English vermilion for light red; have also a pot each of black and white. These will do for the face.

The strips are made by stretching two pieces of muslin or canvas on the table, one piece atop the other, and laying out the top strip in ribbon form with scroll returns in effect on the ends. It is important to have the form of your lay-out so correct that it will fit when turned back to back, which is done when the strips are sewed on the net; and the rule applies also to the centerpiece outline and all other strips. They should be so formed as to match back to back. This is easily done by using patterns for the ends of the strips.

Those doing a large trade in this line have stencils made on tough paper, which they use during the campaign season. One must have the full number of stencils to do this, both of the cut-in and stencil kind; these are very useful as end patterns and for ornamental work. With

the stencils you can finish four strips while you are lettering three by hand. It takes about as long to make a stencil as to letter two strips by hand. Shading also may be done with stencils, and even in the portrait work they may be used, though it takes several, about six, while the blending, etc., must be done by hand, as also the deep shadows and the high lights. The expert who furnishes the information adds, "I have, after mixing the necessary colors, finished from eight to ten portraits in a day on painted cloth, while four portraits in a day by hand from a pounce pattern is considered enough."

The painting done the next step is to lay the strips on a clean floor, or on your table if it is sufficient. Place the strips back to back, match them perfectly and trim the edges so that they will come together nicely when sewed on to the net. Sometimes a large empty room, such as one may find now and then idle, a business house or a dance floor; if you can arrange for such a place it will greatly simplify the work. You will need plenty of room for stretching out the net so that the pieces may be sewed on.

If your color does not cover perfectly go over the weak spots while still wet. The cloth lying on top will allow enough of the paint to go through to make a fair outline on the under cloth, and when you remove the upper one you can proceed at once with lettering the under one; if it is not wet enough take a wet sponge and tap it on the cloth, but do not rub, if the paint is on the cloth from the upper one.

Do not roll up your center piece or strips, but let them hang up to dry, or until ready to send to the customer. There is danger of spontaneous combustion when the painted cloth is rolled up tight, and when shipment is made the advice is usually included to unpack as soon as received; it is also marked RUSH, for the information of the express company.

## PAINTING WALL SIGNS

THIS is a distinct branch of the sign painting profession. Color is a very important feature in its procedure. Sharp contrasts are sought after. A white letter on a black ground, or a black letter on a yellow ground, are instances. But there is a reason; such arrangements enable the lettering to be seen plainly at the greatest possible distance.



But the letters must be of the right size and kind and no crowding. Legibility being more sought after than mere quality of lettering.

Preparation of the surface for wall signs will depend upon circumstances. Is the job a cheap or high-class one? If a brick wall that has never been painted, and that is in fairly good condition, is in hand it only remains to see what sort of job is wanted before beginning. The wall may need to be cleaned or swept down, or it may not. One or two coats of paint may be enough for the foundation, or it may require more. Sometimes a coat of boiled oil is the primer. But this is expensive, as the idea is to give the wall all it will absorb. But it makes a fine foundation. The wall artist is a dope paint mixer who understands his business. He must if he would come out right on much of such work. There are many sorts of paint used, both on wall and lettering. Say it is a blank, unpainted wall, then the first coat may be made from American yellow ochre thinned with one-third benzine and two-thirds raw linseed oil. With driers required. The second coat may be made from white lead mixed with equal quantities of raw oil and turpentine, with one gill of good japan to the gallon of paint. Or boiled oil may be used. Such a paint will give a good enough ground for even a pictorial sign.

If the walls have been painted and are in good enough condition you don't need to paint them, but can lay in your lettering and cut in your dark ground. A very old brick wall may be coated with a filler of yellow ochre, dry, and glue size. When dry apply the oil paint.

For a large sign on dead walls or rock or cliff the following has been well spoken of: Take lime putty, which is the slaked lime minus all surplus water, and color it with green vitriol solution, which turns the lime a yellowish tint. The stronger the vitriol (copper sulphate) solution the more yellow the color. This will form a fairly durable coating, and makes a very neat appearance. It makes a very good ground for large lettering in black or purple.

Here is another cheap form of paint: Take 160 lbs. of gilders bolted whiting and mix to a paste with water; add 6 galls. of hot soft soap; then break up 60 lbs. of white lead in 3 galls. boiled oil, mix to a paste, then add 3 galls. more of the oil; then stir in lead and whiting together. This paint will be much finer if run through a paint mill.

A red ground for a cheap job may be made from glue size. Take at the rate of 4 oz. common brown glue to the 4 galls. water. Dissolve

an ounce of pulverized alum in hot water, add it to the glue size, then stir in enough Venetian red and yellow ochre to form a brick color. Two coats of this will usually be enough to make a good lettering ground.

The ground for a good deal of commercial advertising lettering is made with dry lampblack mixed with boiled oil to a working consistency. If the wall is new, or the weather cold, add a little benzine or gasoline, which will cause the paint to flow and spread more readily.

Concerning the lettering it is generally agreed that no other form of letter is so well adapted as that of the block, round, square, full or thick, and thin. The higher the lettering, or farther away it is from the reader, the fatter the letters must be. But the sign should have a generous margin, as we observe in ordinary sign lettering. To secure a proper spacing of the sign it is best to first prepare a sketch on paper, taking the dimensions of the sign space, as well as the lettering, and being very careful to get your measurements correct, or you will have trouble. Take some wall paper, this being about as good a paper for the purpose as you can get, and tack it down on your board or table, and then set out the letters, using a scale of an inch to the foot. When you have finished this, mark with small downward strokes under and between each letter the number of inches allowed for each letter and space, likewise the margins and end spaces. Then when you mark the letters and spaces on the wall you will have each inch represented by a foot or 12 inches; this is the method used by all the best sign letterers.

To set out the letters, use a strong line and chalk; strike the horizontal lines first, and use a plumb bob, such as paper hangers use, for getting the vertical lines right; attach the line to a nail in the wall.

One needs to be careful when spacing the letters, especially such as A, F, I, J, L, P, T, V, W, X and Y. For instance, take V A W, three of the long letters, and note the space occupied by them. Then place the letters ILM. Also note the spacing between the letters A, Y, T, A. The matter is so clear that with care no painter will err in using any of these letters in any similar combination.

Another good rule to observe is, never to have two lines of letters following the same size; also, allow ample space between each letter and word.

To measure the space that is to be lettered on a wall, especially when it is high, if the wall is of bricks you can count the bricks across the wall, also the rows, vertically, estimating four bricks as a thickness of 13 inches; a brick is 8 1/2 inches long, by 4 1/4 inches wide, and 2 inches thick. The mortar will vary from 1/4 to 1/2 inch thick. The length of a swing stage being known this may help in measuring.

To "break on" letters the painter means the act of painting the letters in the rough, followed by cutting in around them with the ground color, usually, though not always, black. This method enables the painter to do a large amount of sign work in the shortest possible time.

White letters may be broken in with pure white lead thinned with benzine. This paint will dry quickly and allow the painter to cut in with the ground color at once, without danger of the two paints working together. This is especially a valuable feature where a very large area is to be lettered, as it enables the workman to finish the sign where his stage is before moving it to another part of the work. Where the work is near to the ground it may be done from a ladder, and oil color may be used, the cutting in being done the next day. In this case benzine is not used, but oil and turpentine with some driers.

Benzine paint will not, of course, give a durable job, but then durability is not always sought, many signs being temporary, or yearly contracts are made, where durability is neither expected nor desired, as the signs must be changed. Yet such work will last well for about two years.

Flat bristle brushes not less than 4 inches wide are used for breaking on letters, and for filling in the background. Cutting in and making borders, outlines, etc., may be done with sash tools, one to three inches wide. Usually the brush used in the lettering color, which is always light, can finally be used in the background color, after becoming too short or stubby for lettering with.

## GILDING LETTERS ON GLASS

THE glass must be perfectly clean, inside and outside the window. Make up a paste from whiting and water and apply it to the glass, covering it completely; when this has become dry remove it with a soft



rag, then polish the glass with tissue paper. Some follow this with a sponge dampened with alcohol, but it is not necessary.

As glass does not readily take the chalk crayon used in laying-in the letters we must size it with weak gelatin size or with vinegar. But the size must be carefully prepared and strained, so that no specks or dirt is left on the glass.

The inscription may then be outlined on the outside of the glass, with a chalk crayon; the horizontal lines for the letters may be made by snapping a chalk line, or with a crayon and straight edge. Sharpen the crayon to a point.

The gilding is done on the inside of the glass. First, the parts that are to be gilded must be prepared with a size, which is intended to hold the gold leaf to the glass. Both the size and its application are very important parts of the process of gilding on glass, more especially the size. Russian isinglass is considered the best substance for the size, though it is seldom used, owing to the trouble in preparing it and its cost, which is greater than that of any other available size. Probably most sign painters use gelatin capsules, which are cheap, convenient, do very well, and may be had from any drug store. Sheet gelatin also may be used. The amount of the substance used in making a size for gilding on glass is not a fixed quantity; for instance, some painters use a piece of Russian isinglass about the size of a silver dime, while others will use a piece as large as a postage stamp; of gelatin capsules, some use one, others two, and still others three; the quantity of water in these cases is usually a half-pint, though some use as much as a pint. The boiling time also varies with different workmen, the time ranging from thirty seconds to five minutes. Russian isinglass is a very tough substance, hence requires considerable time in its reduction by boiling, and even then there is usually a portion that does not yield to the boiling, but has to be strained out. Gelatin will dissolve almost at once, without boiling, though most painters prefer the boiling, as it seems to give a better size. The subject will be further dealt with in another place.

The size is flowed on to the glass with a 2 1/2 inch camel hair brush; the leaf is applied at once, for it will not do to allow any of the water-size to become dry before the leaf is placed. When the area to be leafed is large, size only so much of it as you can leaf at once. Should the size become dry or partly dry, it must be removed by applying hot size on it, though care must be observed not to have the water too hot,

which might cause the glass to crack. It is best to size only enough space to take two or three leaves at a time. Begin at the top of the sign, so that the size will not flow on to the work already done, which it would if you were to begin at the bottom and work up. Avoid making air bubbles when applying the size.

The leaf used in glass gilding is specially adapted for the purpose, and is known as XX leaf; when buying the leaf state that you wish it for glass gilding. To lift the leaf from the book use a gilder's tip, and if less than a whole leaf is required turn the paper that is on the leaf, and turn it back so as to show only the size piece you wish, then draw the nail of your index finger across the gold leaf, following the crease of the paper you turned down, and that will cut it loose; be sure your finger is perfectly dry, as a damp finger would cause the leaf to bunch up. The book containing the gold leaf may be laid on the lid of a tobacco box, the stitched end of the book towards you. If the tip does not take the leaf up well pass the hairs of the tip across your head or face, holding it with your right hand and gently pressing the tip down with your left. This gives it a little grease, which causes the thin hairs to take and hold the leaf until you transfer it to the glass. Be careful that the tip does not touch the wet glass. There is a knack in taking up and laying a gold leaf; first, the tip is laid flat on to the gold, then it is quickly taken up and the leaf laid against the wet glass. Just before it touches the glass it may want to "fuss" a little, and may seem to fluster and fly; this is a critical point in the amateur's efforts. When you have had sufficient experience you will not mind a little thing like that; the expert's leafing looks very ragged when first put on. In a little time the leaf settles down smooth enough, and the expert does not care if the leaf covers beyond the limits of the outlined letters; in fact he wishes it so. Any defects, such as uncovered places, he will attend to further on.

Finish one letter before beginning to gild the next; let the edges of the pieces over-lap a little, about  $1/8$  inch, which will insure a good join. If the leaf slides a little, due to excess of size, touch the tip to the glass, just under or at bottom of the leaf, which will prevent further sliding.

Having covered all the letter spaces with leaf, allow the work to dry. By that time you will see that the wrinkles, which marred the work

when the size was still undry, have disappeared, smoothing out in the drying.

The expert may use whole leaves of gold when working on large jobs, but the learner must not attempt it; in fact, the expert will tell you that he saves time in using half-leaves instead. If the line of letters is not over three inches in height you may gild the line solid; while it will use up more leaf, it will pay in the time saved.

When the gilding has become dry take a wad of absorbent cotton, about the size of your fist, compress it a little in the palm of the hand, and then, with a circular motion, rub the gilding lightly, to remove all loose and surplus gold; this is called burnishing. The leaf that rubs off may be saved and sold; have a cigar box covered with fine wire screen, and rub the cotton wad over the wire, and that will cause the fine gold to drop into the box. Where much gilding is done the gold thus saved amounts to a tidy sum in the course of a year. Place all the discarded cotton wads in the box. This saved gold leaf is called sweepings.

Now we may patch those places that did not get covered with the leaf. Take the size that was left from the first operation and add to it an equal amount of clear hot water; apply this freely to the work, beginning at the bottom line and working up. If size runs on to wet gilding it will not stain it; whereas, running down on to dry gilding it would likely do so. Size and gild any place that was not covered the first time. The gilding that is opposite the eye, hence plainer as to any defects, may be double-gilded, but any other place may be patched and look all right. The breaks and holes seen on gilding when viewed from the back always occur, but disappear when patched and afterwards sized.

On a large job one may take a section of it at a time, beginning at the top and sizing and patching on down, then going to the top again and doing another stretch down. In this way we can avoid staining or streaking the dry gilding.

The patching done, let the work again become dry, again burnish with the cotton wad, then you are ready for the "backing up." To hold the gold it must be protected by a coat of paint. This paint is known as the backing-up color. There are various formulas for making it, sign painters having their preferences. But this protective coating



must be tough, elastic and opaque. However, the character of the coating will usually be determined by the time allowed for getting the job out to the customer. For a quick job the backing-up must be quick drying, hence it cannot be as durable as one slower in drying. The most durable color would be that made from keg lead, thinned with equal parts of fat oil, raw oil, and coach finishing varnish. It should be made as heavy as can be applied with a lettering pencil. This paint will dry slowly, but will become as tough as leather, and will preserve the gilding for years. For a quicker drying paint take lamp-black ground in japan and thinned with good rubbing varnish. The greater the proportion of the japan black the quicker the drying. Turpentine should never be used in a backing-up color, because it injures the brilliancy of the gold leaf. For further information regarding backing-up color see the subject in another place.

Apply the backing-up color with a suitable soft brush. Coat each letter carefully to its edge. First, we might outline the letters with black, let it dry, then back up. After the paint has had time to become hard remove any surplus leaf by rubbing across the letters with a damp cloth. Then true up the letters with a sharp chisel and a ruler. Then another coat of backing color might be given. Having outlined the letters with black, about an eighth inch wide, or a fourth inch, according to size of the letters, then do the rest of the letter, with a black color, which may be made from either Prussian blue or black, or both mixed. This outlining the gold letters serves a double purpose: it makes the letters look better, and it prevents moisture getting under the edges of the gold leaf. When the second backing is dry apply a coat of best coach finishing or spar varnish. Let the varnish extend a very little over the backing paint. Apply the varnish with a sable pencil or brush. In about two years it would be well for the sign to have another coat of the varnish.

Sometimes a job of glass gilding has a background, which may be black, blue, red or green, or any color that is opaque. For a dense black take Prussian blue one part, and best lampblack two parts, mixing with boiled oil; and a little japan gold size for the first coat, but none for the second. Black japan also will do. The first coat must be perfectly dry before applying the second. If red or green are used, stipple the blackground and apply two coats; mix with coach varnish.

**MAKING SIZE FOR GLASS GILDING.**—Sign painters will agree that Russian isinglass, so called, makes the best size, although they seldom, if ever, use it. The reason for not using it has been given. To make the size take a piece about the size of a silver dime and pour over it one-half pint of distilled water, preferably, or filtered rain water, and let the water boil on the stove until the isinglass is dissolved. This usually takes about five minutes, though breaking the substance into small bits will greatly facilitate the dissolution, and in any case there will be some remaining undissolved isinglass. After the boiling let the size become cold, then strain it through old silk, and if then filtered through blotter or filter paper you will have a clearer size.

American isinglass is similar to the Russian in being obtained from a fish. But it differs materially in all other respects. It is cheaper, for one thing, and requires more to make the size, a piece about two inches square being used to the half-pint of water. It dissolves readily in hot water.

Gelatin capsules are the most commonly used in making size, especially for hurry work, as they instantly dissolve and are readily obtainable. Usually two or three are used to the pint of water. Sometimes gelatin, such as we use as a food, is used. One painter says he uses gum Arabic, and with good results. Gelatin is simply a fine grade of animal glue. Isinglass, so called, is derived from fish bladders.

Russian isinglass is obtained from the swimming bladder of the various species of *Acipenser*, of which family the sturgeon is, perhaps, the best known to us. It is very abundant in the Atlantic and adjacent waters. A larger size of this fish inhabits the waters of the Caspian and the Black seas. The bladder, when dried, is very tough, hence difficult to dissolve; in fact it does not dissolve at all, but simply yields a gelatinous substance which we use as a size, while the remainder, much enlarged from being boiled, is strained out. Russian isinglass looks like dried fish skin, very hard and tough.

American isingless comes from the air bladder of the sturgeon, but is very dissimilar in appearance to the Russian article, appearing more like crinkly tissue paper than fish skin. The air bladders are dried and cut into strips of short length and tied in small bundles. As stated, it readily dissolves in hot water.

Of gelatin the French is to be preferred. The capsules are of very

pure gelatin, hence preferred by the sign painter, though some workmen use any form of gelatin, even to common glue gelatin. Place two or three in hot water and the gelatin is melted.

The word isinglass is said to be derived from icing and glass, while some authorities on sign painting say that it is derived from the mineral mica, which is commonly called isinglass. Yet there is no resemblance between the two. In fact, isinglass refers to gelatin, and not to mica, although, as stated, mica is commonly known as isinglass. It would be better to designate each substance by its proper name, the one a fish glue, the other a mineral, mica.

Isinglass is sometimes found adulterated with gelatin. A suspected lot may be tested by immersion in cold water. If pure it will become white and opaque, appearing like cotton threads, which swell equally in all directions. If adulterated with gelatin the sample will become transparent and ribbon-like.

In the preparation of size it is absolutely necessary to observe perfect cleanliness; the porcelain vessel in which the gelatin is dissolved must be clean, no grease about it, and also the hands should be clean, as the least bit of grease will cause trouble. When the size creeps on the glass we know that there is grease present. Washing off with water, followed with alcohol, will remove the grease. Then, should this fail to remedy the trouble, new size must be made. As such size spoils readily in warm weather it is best to prepare it each day, or for each time that you may need it; do not try to keep it over night. Some add alcohol to the size, and this would of course prevent decomposition for some time, though the spirit is not used for that purpose, but because it is supposed to make better gilding.

Then the size must not be used too strong, a point that will manifest itself when the gilding is done; if too strong, the gilding will appear more or less clouded; it will not be as brilliant as it should be. In fact, the size may safely be used when very weak. Obviously, the less matter there is between gold leaf and glass the brighter the gold will show from the outside. At the same time the size must not lack sufficient binding power, in which case the leaf would, in time, scale away from the glass. As weak size gives the best luster, experience must show you when you have it at the right condition. The leaf should not rub off easily.

We prefer to apply the size while cold, but sign painters differ on



this point; some prefer it cold, others warm or even hot. You will discover in time which is best.

We have mentioned the matter of gold leaf sliding down on the glass when applied to the wet size; we advise stopping this with the tip, but some prefer the finger, first run across the face, to grease it a little, then run it across the glass, under the sliding leaf. The objection to this plan is the grease; we do not like to have any grease on the glass. The sliding of the leaf is due to an excess of water size, and hence it is better to wait a moment after applying the size, until the water stops flowing, before applying the leaf.

If you find that the size has been too strong, which will be apparent from the dead appearance of the gilding, apply hot size, as hot as possible without endangering the glass, which will wash out the excess size from beneath the gold.

Mention has been made of the addition of alcohol to the size; in a preparation containing one pint of water and three capsules there is added as much as one-third pint of the alcohol. Many who use it this way claim that it makes a clearer gilding, besides which it will destroy any grease that may be present. While not many sign painters appear to use alcohol in the size, yet we have not heard of much criticism against it.

**BACKING-UP COLOR.**—This is intended to protect the gilding. We have described this paint as being opaque, tough and yet elastic. Also formulas have been given for making the paint to meet varying conditions. It may be added here that there are many different formulas, each painter having his favorite one. We have given a formula for what is generally conceded to be the most durable one. Some painters use chrome yellow instead of white lead, medium shade, and either dry or ground in japan; they thin it with wearing body varnish. There does not seem any reason for preferring the yellow lead chrome to white lead, unless it is the color, which approaches nearest to the gold.

We will give here some formulas that have been given through the trade press by experts. For work that may be left over night to dry, after the backing up color is on, take ivory drop black, or Indian red, or orange chrome, ground in oil, thin out with good coach rubbing varnish, then add some turpentine until thin enough to work under the brush. For work that is to finish up the same day use lampblack in japan, thin with varnish and turpentine.

Two-day rubbing varnish colored with lampblack ground in japan. This backing dries hard in about seven hours, and cleans up sharp with clear edges and no chipping.

Equal parts of fat oil and coach finishing varnish, mixed with white lead, or any desired color, will give a hard, tough backing. This painter had a job of gilding on a store window, protected with this backing, that lasted 16 years, without chipping.

Thin up some lampblack, ground in japan, with gold size japan, apply it, and when it has the right tack rub on aluminum powder; then edge or line the letters neatly, and the back will look much neater than where black is used.

Black japan backing gives a brighter gilding than lead or chrome yellow does, says an expert; but one of the biggest sign painting firms backs-up entirely with a paint made from dry medium chrome yellow, wearing body varnish, and japan drier.

Another sign painter states that artists' asphaltum in oil and lamp-black in japan are two of the best colors for backing.

Dry ivory black, or dry lampblack, japan, and a little wearing body varnish is a formula much used. Also, japan black, gold size japan, and about one-third as much spar varnish as gold size japan.

An expensive but very durable backing may be made with tin foil. Grind some dry refined lampblack with a palette knife on a glass or stone slab, adding a little spar and rubbing varnish and a few drops of boiled oil. This will give a very elastic color. Let the backing dry until the next day, then varnish the backs of the letters, on to the backing color, with a medium drying varnish; it may be better to varnish only a few letters at a time. Make the tin foil smooth, using very thin foil, and cut it out so that it will extend over the edges of the letter about a quarter-inch; lay paper on the foil and press it down smoothly. Then remove the paper and run your finger over the foil and around the edges. The letter will show through the foil as an impression. After covering all the letters with the foil take a steel ruler or other straight edge and a sharp knife or sharp chisel, and remove all the foil from around the letter, keeping a little inside the lines, so that the foil will not show from the outside. Then back up the foil and edge-line the letters with spar varnish and Prussian blue, or other desired color.

Formerly asphaltum was favored for backing up with, but while

it answered well enough for small letters, for large surfaces it was too brittle and hence was discarded.

If the letters are shaded the backing-up color must be of such a nature that it will not soften up under the shading color. The best backing for a single-gild job is orange chrome yellow mixed with gold size. For a double-gild use japan black. For shading letters, designs, etc., use equal parts of japan chrome yellow, rubbing varnish and spar varnish.

Apply a coat of black japan to the letters, and when dry remove the surplus gilding, make the surface ready, and apply a coat of vegetable black mixed with milk. The sign painter who gives this method says it is better than a quick black.

Mix japan black with japan and varnish; back-up with this, and let it have time to become hard-dry. Then apply a coat of white lead in oil mixed with boiled oil and coach varnish, equal parts. This paint will dry slowly, requiring about three weeks or more, and then a coat of the best spar varnish may be applied; let the varnish extend beyond the letters about one-fourth of an inch, or less.

Some sign painters like drop black for the backing-up pigment, but it is not as dense a black as lampblack, and therefore does not cover as well. Prussian blue added to lampblack makes a dense black, and is intensely black too.

Just before backing-up take a straight edge and lay it at top and bottom of the line letters, and with a knife or needle scratch through the leaf a trifle from the edges, and omitting the O or other letter that must go above or below the horizontal lines.

After the backing-up is dry, go over the entire surface of the glass with a piece of flannel about six inches square and soaked with water, but wringing it out as dry as possible, and sprinkling on it a little precipitated chalk; rub across the letters with the cloth, which will remove all loose gold, etc. Place the cloth square under the hand and rub with a circular motion. After having cleaned up in this manner, take a damp chamois and go over the glass with it, to remove any remaining specks of gold, etc. Repeat if necessary, until the glass is perfectly clear. Then true-up the letters with ruler and chisel. Then you may apply another coat of black. Or varnish, going a little beyond the lettering in order to secure the edges.



The best brush for applying the backing paint is the French camel hair letterer, and for average work use Nos. 5 and 7.

Use rubbing varnish in preference to japan gold size; it does not gum up the brush as the gold size does; but for quick jobs the gold size is better.

Some sign painters, when they have a hurry-job to do, will rub aluminum bronze over the fresh or undry backing, which takes away all tackiness; but this endangers the leafing and gives ragged edges.

The chalk lay-out will show clearly through the gold, and is easily followed by the pencil when applying the backing color.

### PAINTING SIGNS ON GLASS AND WINDOWS

THE painting of signs on show windows should be done so as to allow of the light passing through without much obstruction. Embossed gilding is the most attractive form of such work, though mock embossing is a close second in point of attraction. The advantage of the mock embossing consists in the fact that it reflects the light equally, which cannot be said of burnished gilding. Where a window is lettered with both burnished gold and matt or mock embossed work, with the two kinds mixed, it is difficult for the pedestrian to read the inscription; all the important words at least should be treated alike, so that all will appear alike.

**TRANSPARENT WORK ON GLASS.**—For plate glass or show windows. Mix your color of equal parts japan and two-day rubbing varnish; apply, and rub it out as thin as possible, using a flat bristle brush; get it on even. Just before the color sets hard go over it with a pounce pad of raw cotton in a piece of clean cotton muslin, working carefully and evenly over the glass. The color must not be applied in too heavy a coat as light is to show through it. Take time and pains, for a good job.

For blue take Prussian blue; for red, crimson lake; for yellow, Indian yellow; for brown, burnt sienna; for black, lampblack; etc. The colors may be rubbed into a size made from Venice turpentine two ounces, and spirits of turpentine one ounce. Apply with a brush. Fine and brilliant colors may be obtained by using aniline dye in white shellac; the objection to these colors is that they are very unstable, and hence

not entirely satisfactory. In its stead we may use any of the transparent mineral or chemical colors thinned out with turpentine, or the colors may be mixed as desired to produce other colors. Whether this or the shellac and aniline color is used, if you have panes or sheets of glass to coat, the color may be poured onto them and allowed to run off, this effecting a smoother surface than can be secured with the brush.

**LETTERING IN BLACK ON INSIDE WINDOW.**—A sign in black letters done on the inside of a window entirely perished in six months. The color used was lampblack ground in japan, thinned with turpentine, and having a little spar varnish as a binder. The color was too brittle for glass. The better color is made from coach japan black  $\frac{2}{3}$ ; Prussian blue  $\frac{1}{3}$ ; mix with  $\frac{3}{4}$  boiled oil and varnish  $\frac{1}{4}$ . If a second coat of black is applied, mix boiled oil and spar varnish equal parts, using no japan drier.

**WATER COLOR LETTERING ON WINDOWS.**—The window glass must be made quite clean. The white paint for lettering with may be made from equal parts of dry zinc white and white lead. Thin with water, and work it fine on a marble or glass with a spatula; make a thick paste of it. For a binder use gum arabic or white glue. Thin the white paste with the binder liquid so that it will work nicely under the brush or pencil. Use the color as heavy as you can, and avoid going over a part more than once. Make each letter quickly, avoiding over-stroking, doing this if necessary when the letters are dry.

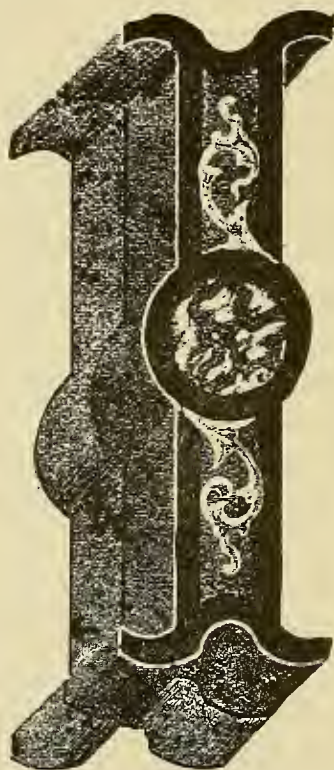
About ten drops of mucilage to a teaspoonful of paste is right. Mix with paste, after which water may be added until the mass is about like thick cream. Use a camel hair brush.

If colors are desired use fresco colors, in glass jars, adding a binder as for white. Brushes for such work should not be used for any other sort of work.

Mirrors as well as windows may be lettered and ornamented with this water color.

**PAINTING PICTURES ON GLASS.**—It is rather difficult to paint a picture direct on glass, nor is the transfer method good. The best way to do it is to take a piece of paper a little larger than your picture, and saturate it with boiled oil; wipe it as dry as possible, give it a coat of paint, made from white lead thinned with raw oil one part and turpentine two parts. When dry rub it lightly with curled hair, to

remove specks or nibs. A paper about like ordinary writing paper will do. Paint the picture on this prepared paper. Varnish the glass with a pale finishing varnish, flowing the varnish and brushing it out smooth and level; when the picture is painted place it on the varnish surface and gently rub out all air blisters, with a piece of rubber about 2 by 4 inches, which must have a perfectly straight edge on it; the rubber should be about one-fourth inch thick. Begin rubbing at the center of the picture, moving towards the edges; don't press too hard on it. After the rubbing out let it stand until the varnish on the edge sets or dries, then paint the back of the picture or cover it with foil.



WINDOW SIGN IN OIL COLOR LETTERS.—Dry color, very finely ground, mixed with pale copal varnish, a little gold size japan or common japan drier, and thinned with turpentine, will give a good covering paint, but japan color also gives a dense body and is finely ground. Use any good covering pigment, such as black, brown, olive, etc. One coat usually does, but two coats make a better job. Drop black needs lampblack with it, to give a good body color. The intensest black is got by adding Prussian blue to the black. Usually the way is to glaze with the blue, and when dry give a coat of black over it. But where



only one coat is to go on better mix blue and black together. A good brown may be obtained from two parts black, one part yellow, and three parts red. Thin with three parts turpentine, one part oil, and a little japan drier.

In painting on glass it is difficult to get a uniform colored surface with some colors; the reds particularly act badly, the oil separating from the color. A chemist is said to have found that the addition of five per cent. of boric acid to the thinners will result in a smooth, even coloring.

### GLASS EMBOSSING, ETCHING, CHIPPING, ETC.

**GLASS EMBOSSING.**—The first step in this work is to have a suitable room for doing the work in, as the acid fumes must be taken care of; ventilation must be good. Next, you must have a suitable table, and it must stand level, or very nearly so, and any lack in this respect to be corrected by levelling the glass on the table; for this purpose have some thin wooden wedges, which are to be placed under the edges of the glass wherever needed to make it perfectly level. The glass must be washed with sal soda water, then be rinsed in clear running water, after which wipe dry with tissue paper or silk. Everything used in connection with glass embossing must be clean.

Glass varies in composition, some being harder than others. For this reason the acid must have a strength proportioned to the hardness of the glass. To test the strength of the acid try it on a piece of the same glass. If this is not possible, then try the acid on the work, making it weak, then gradually increasing its strength until it is right.

What is called lead glass is easily acted upon by the acid used in embossing, and it also gives the best matt effect.

There are several methods in use for this work, and they mostly follow along the same lines. Here are a few.

The inscription is drawn on paper, and is called the lay-out. This is placed under the glass; the inscription is then traced on the face of the glass with a lettering pencil, using the best asphaltum varnish, thinned out properly with a little turpentine and some driers. This varnish is known as "the resist," and that is what I shall term it in the following account. It resists the action of the acid. It is not safe

to use common asphaltum varnish for this purpose. Brunswick black is simply the best asphaltum melted and mixed with a certain proportion of linseed oil, boiled with litharge until stringy, is added; the whole is then boiled until it will set hard when thinned and applied to glass. A cheap grade of asphaltum will likely contain some rosin.

Now fill in around the traced letters with the resist, being careful not to miss any part, and then let the work stand in a clean place for at least 24 hours, though 48 would be better. And two coats of resist will be safer than one coat. Examine the glass carefully for any possible pin-holes or uncoated places where you have coated it, and if any exist apply some resist to the places. Usually two coats makes a perfect covering. It is also very important to have the resist dry hard before applying the acid; soft resist and grease are two foes to good acid embossing.

If the letters are not true when you have finished applying the resist you can true them up with a chisel, but this must be done before the varnish becomes too hard or brittle, in which condition it would scale or chip and mar the work. If you will take great pains in tracing the letters with the pencil you will not need to true them up afterwards, and this is best, because in cutting with a chisel one is apt to loosen up an edge, which would allow the acid to get under and spoil the job.

When the resist has had sufficient time in which to become hard lay the glass again on the table and make level, as before. Be sure that the glass is perfectly clean and free from dust or grit. Now make up a cement of beeswax, to which is added a little asphaltum varnish, to make it more pliable, and place an edging of this around the edges of the glass, about one-half inch high, forming what is known as a dam; this dam must be carefully placed in order to prevent any leakage of the acid. Now you are ready for the acid.

This acid is called hydrofluoric, it being prepared from fluor or fluorite with sulphuric acid. It eats into glass, porcelain, etc., it being therefore necessary to keep in gutta percha, lead, or wax bottles. Its fumes are very dangerous and must not be inhaled. There should be abundant ventilation where it is used. An open window at the table will be useful, or the work might be done in the open air.

Hydrofluoric acid may be bought in one-pound bottles ready for use, or it may be shop-made, as was done years ago, but it is not advised, as

the saving would be small and would not repay the cost of time and materials, saying nothing of the danger in mixing the acid and fluorite.

Before using the acid try it for strength, as previously indicated; dilute with water if it is too strong. If it is too weak it will not eat the glass properly; but if too strong it will cause the resist to curl from the edges, making a ragged effect. It is well also to test the asphaltum for resistance to acid.

The acid being ready, pour it onto the plate to a depth of about one-fourth inch, so that it will cover the glass completely. With a gentle rocking motion stir the acid now and then, so that its strength may be equalized among the letters, for as it eats the glass it loses its strength, hence needs continual stirring to remove the weaker acid from contact with the glass, and allowing the upper unaffected acid to come in contact. In ten or fifteen minutes tilt the glass so that you may see how the acid is eating, and in about twenty minutes the work should be finished. The effect of the acid is to make an icy-looking surface where it has acted, depth of eating not being necessary, for all that is required is that the letters may be thus glared, so that when they are leafed the letters will appear matt or dead, under the gold leaf.

The etching being satisfactory, break away a corner of the wax dam and pour off the acid into a proper bottle for future use; do not put it with the unused or fresh acid. If you should want to use the old acid, used once before, then add some fresh acid, to bring it to the proper strength.

Now wash the plate in running water, and examine it for defects; if there are any they must be rectified by re-coating and more acid. But if the work is perfect, then remove the wax dam and put it away for future use. Remove the asphaltum with turpentine or benzine, and make the plate clean of the resist material. Then wash off with sal soda and water, rinse in clear water, and wipe dry. The glass is then ready for gilding. To gild, use a water size, same as for ordinary glass gilding.

Very obviously, acid etching can not be done on windows, but what is called mock embossing can be employed there very nicely, and this will be described in another place.

As previously stated, there are various ways in which to do embossed sign work on glass. We have just described one way. Another way



is to acid-emboss the entire glass, one side of course, and then gild the whole surface, making it matt. Or you may paint the lettering on the embossed glass, using black or other color, then gild over the entire surface, which will show the letters with a gold backing. Again, the letters may be matt-centered with acid, leaving a plain or unembossed outline that may be gilded and burnished, the leaf on the middle part showing matt. Then the letters can be outlined with a very fine edging, this causing the letters to "stand out," as it is called.

Fire-flashed glass, which is colored on one side only, may be lettered on the colored side with resist or asphaltum varnish, while the rest of the surface is acid-embossed. The letters, after removal of varnish, will show colored, same as the colored side of the glass; or the operation may be reversed, leaving the letters uncolored.

**THE CHIPPED GLASS SIGN.**—The factory method of doing chipped-glass work is, briefly, as follows: The design is drawn on manila paper, which is then pasted on to the glass. Those parts that are to be chipt are cut out with a sharp knife, care being taken not to injure the edges of the remaining paper. The cut-out parts are then removed from the glass, leaving the glass beneath uncovered. The glass is then placed under a wooden hopper, paper side up, when a sand-blast is directed upon the glass, to roughen it. It is said that a fall of ten feet, with no pressure on the sand, will be sufficient to roughen the glass, but I have never verified this. With the hopper or hose it requires a pressure of about 90 pounds, so that the mere gravity fall of the sand would hardly suffice. However, if the gravity fall of sharp sand should be continued long enough no doubt but the face of the glass would become matt to some extent.

After the glass has been sufficiently roughened it is removed and coated with glue, paper and all. The glue is usually the best noodle, and it is applied liberally, its condition being about that of common varnish. The glass is then left in an ordinary warm room until dry. Thence it is removed to a special room or kiln, where it is placed in a rack, set on its edge. Here the temperature is raised to about 280 deg., Fahr. The heat is furnished either by coils of steam pipe, or by rows of gas jets, placed near the floor. In about twenty minutes the heat is reduced to about 90 deg.

This heating causes the glue to curl off in flakes of different sizes

and forms, but so tenacious is its grip on the glass that it brings some of that away too, thus producing the chipt effect.

Small sheets of plate glass may be chipt in a stove oven, heated to the usual bread baking point, the preparation and treatment being the same as with the method employed commercially.

Expert advice given by a trade publication contains the statement that any kind of glue does for this glass-chipping process; this is not correct; a very high grade glue is necessary, such as noodle and Irish glues. It ought to occur even to an expert that the stronger the glue the greater its pulling quality. Another authority says that glues are made especially for chipping glass, which is strange if true.

The preparation of the sign should be done in a warm room, say with temperature at above 70 deg. And the glass should be heated before the glue is applied. Lay the glass on the table, level or flat. Have no drafts of air in the room.

The glue will not act unless the glass that is to be chipt has been roughened on its face, and the coarser this is the better the glue can pull it off.

The glass must first be made perfectly clean, as any trace of grease or dirt will prevent the glue from adhering properly.

In place of paper you can use a compound of glucose and dextrine.

Both ornaments and letters are cut in the paper mask, and the paper remaining after the cutting out of the parts that are to be chipt is left on while the glass is under the sand blast, also when it is being exposed to the intense heat. After the paper is washed or scraped off the letters and ornaments, if any of the latter, are painted as desired.

**METHOD 2.**—Make the lay-out on thin, hard white paper, and draw the inscription with a hard lead pencil. Then rub oil on the back of the paper, which will make it transparent, showing the inscription from beneath. Coat the glass with thin asphaltum varnish, then lay a sheet of tinfoil on the asphaltum, and rub it smooth with a soft pad, rubbing until you expel most of the asphaltum from under the tinfoil. Now set the glass on the table, foil side up. Then place the paper lay-out on the foil, face down, and with a hard, pointed tool trace the lay-out on the foil, backwards. Then remove the paper, and go over the foil with a sharp pointed needle and cut out the foil from each letter. This done, and the asphaltum dry, place a piece of paper over

the letter and press down the edges. Now wash out any asphaltum that may remain within the letter spaces with turpentine. This must be done carefully, so that the edges of the letters are not injured; if any should be raised during the cleaning off, replace them. The glass should now be ready to receive the acid. This part of the work has already been explained.

The particular advantage of the tinfoil method is, that it is surer than the asphaltum resist, as to the edges. With the asphaltum resist you should coat the edges of the letters twice, and do it very carefully, or your acid may cut or eat through the edges of the letters and spoil them.

**TRIPLE EMBOSSING.**—This is sometimes called French embossing, and may be considered an improvement of the single embossing method. At least it enables us to get a more diversified class of embossing, though with considerable more labor and trouble. By the single method the glass must be made matt by grinding with emery, after the hydrochloric acid bath. That is to say, the parts not acted upon by the acid are ground matt. By the method only two tones could be produced, while by the French method as many as five may be made. As follows:

1. The dense white matt effect, produced by the white acid.
2. The same reduced one degree by the application of fluoric acid.
3. The same reduced two degrees in the same way.
4. The same reduced three degrees.
5. Clear plate glass.

These different tones are not produced in exactly the same order as listed, where the clear glass is carried through to the last and so may be regarded as first produced. The parts that are to be clear are covered by the first application of the asphaltum. The white acid is then applied over the whole plate. At the second operation the parts that are to be kept to full density are painted over. This gives us No. 2. More detail is painted on, fluoric acid is applied again, and we have No. 3. Finally No. 4 brings back almost the clear glass, but with a satin finish. The gradation of these five steps is very even or uniform. With a little care in the managing of the acid any tone may be obtained by varying the length of time of the exposure to the acid.



It may be said here that perhaps a better way would be to give repeated applications of one strength than to increase the strength successively, say the white acid all over, then apply it once on a part, twice on the next part, thrice on the third part, and so on, this method giving the same effect as the other. For some kinds of glass signs this way is very desirable; floral or other ornamental work, for instance, by which very fine shading may be made. It is not safe to increase the strength of the acid beyond certain limits.

**FRENCH EMBOSSING PENCIL WORK.**—The best resist for this work is four parts best asphaltum varnish and one part best japan gold size. Let this stand 24 hours before applying the acid, for the resist must be hard. Use the asphaltum as stout as the pencil will work it, and avoid leaving any uncoated places. This resist will stand two-hour white acid and soaking in water ready for the fluoric acid; it will not require touching up if properly applied.

The white acid used is not an acid at all; in fact, it is distinctly alkaline when in proper working condition. It is rather apt to go wrong when kept and may require occasional doctoring to keep it right for working. On this account it is just as well to make one's own and to know exactly what is in it. The process is simple, requiring no special apparatus. Common washing soda (1 1/2 lbs.) is added to 1/2 pint of fluoric acid (full strength) and 1 pint of water. The soda must be carefully selected, all the white powdery part being thrown away and only clear crystals used. These crystals may be crushed to make them dissolve more quickly. It may be necessary to alter the proportions a little on account of the quality of the materials or on account of variation of weather. The mixture ought to be tested on a sample piece of glass before used on a large plate. A dense white obscure should be produced in about an hour's time. A very heavy sediment forms in the bottle, which should be shaken up and allowed to settle again before pouring the mixture on to the glass. A sediment is also produced on the glass, which has to be removed by means of a rubber squeegee and water after the acid has been poured off. Different makes of glass will produce very varying effects with the same acid.

Tone No. 2 is obtained by the use of fluoric acid, of usual working strength—about 2 1/2 parts of water to 1 part of acid. Five minutes' exposure is required for this. The same acid will produce No. 3 tone

in fifteen minutes, while for No. 4 an exposure of half an hour will be required. There is of course no means of testing the exposure during its progress, but if these times are carefully observed results should be right.

To the five tones described above is sometimes added the crowning interest of brilliant cutting. This is precisely the same as the cutting and engraving which is done upon table glass and requires heavy and expensive machinery. It is by no means indispensable to a good effect. Gilding of lettering or ornament on door plates, etc., is a useful adjunct to triple etching. Mirrors decorated with light borders and corners of triple acid work before silvering gain greatly in interest and artistic value, the silvering showing up the different tones to great advantage.

**FANCY ACID EMBOSSING.**—The pebbled ground effect is made by covering a sheet of glass with fine shot, as close together as you can make them lie. Then pour the acid on carefully, so as not to disarrange the shot; leave on for about twenty minutes, then remove acid and shot and wash off glass with clear water.

A mottled ground may be produced with a sponge dipt in resist varnish, then dabbing it on to the glass, making a mottled effect; when the acid acts upon the surface it will attack only such places as are not protected with the coating, and hence, after washing off with turpentine, then with sal soda water, etc., the glass will show an intermixture of matt and bright irregular patches, producing a very pretty effect. Another way is to take a pan that will be large enough to take in the glass, and partly fill it with water, and on the water pour some asphaltum varnish, stirring this around unevenly and brokenly over the surface of the water. Now lay the glass against the water with its varnish, being careful about it, and when you lift the glass out the most of the varnish will be on its face. After the varnish has dried on the glass the acid may be applied as in plain embossing.

Ground glass or frosting, as it is commonly called, is done with white acid, which is a mixture of three parts barium sulphate and one part fluoride of ammonium, with enough sulphuric acid to dissolve the ammonium and bring the mixture to the consistency of rich milk. White acid comes in leaden bottles, ready for use. The action of white acid is different from hydrofluoric acid, in that it produces a white frosted effect, the other producing merely a glare, or icy surface. White

acid makes the best imitation of glass that has been ground with sand and water. Other effects may be had with it in combination with fluoric acid, making parts smooth and other parts frosted.

Or, parts may be made matt with fluoride of ammonium slightly acidulated with acetic acid.

**ETCHING GOLD ON GLASS.**—One of the most interesting, and yet simple jobs, especially to a workman who has pictorial ability, is etching gold on glass. This is a very effective way of reproducing emblems, trade-marks, scrolls, etc. Mark out carefully on thin tracing paper, fasten this to the face of the glass with gummed stickers, and gild entire drawing solidly, making no effort to do so with one gilding; that is, without patching. When dry give a couple of hot water baths to clear the gold, then remove the paper drawing to gilded side of the glass, face to gold, with a piece of carbon paper between. The thinness of the drawing paper will enable you to transfer the drawing directly to the gold with the aid of the carbon paper. Then coat the outside or face of the glass with lampblack in distemper. This black will enable you to note each scratch or mark made upon the gold. A stick of jeweler's peg wood and a short bristle tapestry brush are the proper tools. However, a glass etching brush, the bristles of which are made of glass, will be found the most effective for the work. Proceed by etching in the shadows, leaving the gold for the high-lights. When complete, back the entire etching with backing-up black, and remove the surplus gold. All gold work on glass should be protected on the back by a coat of lead and varnish, and finally by a coat of spar varnish, which should be allowed to extend onto the clear glass a trifle.

**STENCILED EMBOSSED WORK.**—Stenciled embosses are useful for transoms and other places where the light must not be obstructed, and where it is not desirable to have the plain glass. Glass office doors afford a good field for this sort of decorative work. If the glass is already in the door, remove it and proceed with it as with new glass. The entire glass may be matted, or only a part, that which it is designed to letter on. Make your sketch on paper, paraffin the sketch, reverse the paper, outline the letters and then fill in around them with asphaltum, then emboss with fluoric acid. Around the glass a border or corner ornaments may be placed, and these must be stenciled on, and done at the same time as the lettering. Now the letters and ornamentation may be ground with emery and water; use a square piece of plate



glass, glued to cork or to wood, and with a circular motion grind the glass all over. The more you grind the better the effect. If the lettering is to remain matt, then protect that part with black, and grind the rest of the glass.

### NOTES ON ACID AND GLASS EMBOSSING

FLUORIC acid was discovered by Scheele in 1771.

In 1670 the artist, Henry Schmanhard, accidentally spilled some aquafortis on his spectacles, and the glass was covered with it. From this incident came the art of etching on glass.

There is no other acid than fluor-spar that will corrode glass of every kind, so that the artist's liquid must have been this, and which was known to some artists as a secret in 1721. The inventor of the acid used it for a very different purpose than that which we now use it for.

Hydrofluoric acid is used for glass etching in three distinct forms, namely: The liquid acid, the gaseous acid, and the white acid.

White acid, also known as French acid, is prepared as follows: Place concentrated commercial hydrofluoric acid in a wooden vessel and add to it perfectly dry crystals of sodium carbonate, previously powdered, until the acid is fully neutralized and a thick paste is formed. Avoid the fumes, do the work in plenty of free air. Great care must be taken to not allow the mixture to remain thin. No quantities can be prescribed because of the varying strength of commercial acid. The mixture need not be perfectly white. The paste is now diluted with about five times its volume of water, and a small piece of glass is etched with some of the composition. If the dulling of the glass is not uniform but weak, so that the transparency of the glass is not sufficiently diminished, there is too much water, and some more paste must be added. This also affords a means of regenerating partly used compositions. It is quite evident that the larger the quantity that can be prepared at a time the better. The practise in some acid works of adding acetic or hydrochloric acid to the paste seems quite unnecessary. In any case the least excess of either will spoil the whole quantity. If white acid is found to bite unevenly mix it with a little strong hydrofluoric acid.

A more rapid etching composition, one that will act in from five to

ten minutes, is prepared by dissolving a soluble fluoride, such ammonium fluoride, potassium, or sodium in water, and acidulating the solution with hydrochloric or sulphuric acid. This rapid etching, however, gives so thin a coat of dull glass that no toning of it is possible. Even in a longer time the rapid composition will give no deeper etching. The etching soon stops when the rapid composition is used, owing possibly to the formation of a protective coat of fluo-silicates, but if the surface is washed with water and then re-etched the etching becomes deeper and closer, and this washing and application of fresh composition can be repeated as often as may be desired. In this case, however, the rapidity of the first action becomes valueless. The rapid composition can be made to give different coarseness of grain to the dulled surface by varying the proportions between its ingredients. The following are two other recipes for white acid: (1) Ammonium fluoride, 30 oz.; distilled water, 15 oz.; sulphuric acid, 6 oz.; hydrofluoric acid, 5 oz.; gum, 1 to 2 oz. (2) Dissolve 25 oz. of potassium fluoride in 50 oz. of water, and 4 oz. potassium sulphate in 50 oz. of water. Mix the solutions and add 16 oz. of hydrochloric acid. In twenty-four hours the solution is ready for use.

Resists, or compositions used to protect parts of the glass which are not to be etched, are variously made.

Most compositions for this purpose contain asphalt, but a mere solution of asphalt in turpentine gives a very brittle coat, which does not adhere to glass with sufficient tenacity. Certain other ingredients are necessary to make the resist more effectual. Venice turpentine answers the purpose excellently in remedying the defects of the principal ingredients, but it introduces a new difficulty, in that the composition flows poorly from the brush.

This is remedied by adding a third ingredient, viz., tallow, but, as tallow hinders the drying, no more than is necessary should be used. Some rosin is added, partly to neutralize the delay in drying. Many persons add a pigment for the same purpose. Whatever ingredients are used a perfectly smooth and homogeneous mixture must be made, and if mineral pigments are employed the use of a color mill is unavoidable. A very good recipe for a composition is as follows: Dissolve 1 lb. of the best Syrian asphalt in 4 lbs. of turpentine by gentle heat (best on the water bath). Amalgamate thoroughly 1/2 lb. of Venice turpentine, 1/2 lb. of rosin, and 5 oz. of tallow. Be careful of fire.

This composition dries in six hours. Some persons use Canada balsam, wax, Copaiba balsam, mastic, copal, damar, etc. The last three serve the purpose of the rosin, but are dearer and not better. Wax and balsams make a rather too slow drying composition. There are endless recipes for these protective varnishes, and every etcher thinks he has got the very best that can be devised.

A satin finish is given by dipping the whole glass in hydrofluoric acid before the resist is removed.

White acid produces an effect like ground glass. For small pieces, where it can be done, it is best to grind the glass with sand and water.

Fluoric acid usually etches smooth, while other fluoric preparations etch matt. Fluoride of ammonium slightly acidified with acetic acid will give a matt surface. But the composition of the glass will influence the result, lead glass being easily acted upon and giving a fine matt.

As stated, the matt is not always the same on all kinds of glass. If the surface does not appear proper and even use the following preparation instead: One part of fluoride of ammonium to three parts of sulphate of barium, also a little sulphuric acid. Mix to the consistency of milk, and apply to the face of the glass.

All acid preparations must be kept in rubber or in lead bottles, or other suitable vessels, of which there are several, one being made from paper and coated with paraffin.

If you have an acid bath sufficiently large you can submerge in it a whole glass, but in this case the whole glass must be coated with resist, face and back. Be careful in pouring off acid that none of it gets on the face of the glass, which would ruin the sign.

Etching fluid, intended for fine work, as with a pen, glass pencil, glass rod, or a hard rubber pencil, may be made from this formula:

Sodium fluoride, 9 drams; potassium sulphate, 108 grains; water, 16 fluid ounces. Make a solution and label No. 1. Zinc chloride, 216 grains; concentrated hydrochloric acid, 10 fluid drams; water, 16 fluid ounces. Label solution No. 2. Method:—Mix equal quantities of the solutions in a gutta percha or leather vessel, or in a glass vessel, the interior of which has been covered with a layer of paraffin, or in a hollow in a piece of paraffin wax. Of course, any less quantity may be prepared in the given proportion.



## IMITATION GLASS FROSTING

WINDOWS are usually frosted to render the glass opaque, cutting off vision from both sides. One of the simplest ways is to dab fresh putty over the glass, which leaves a thin film of oil and whiting that dries hard and is durable. Wax mixed thin with turpentine and a little driers and a drop of varnish is useful; it may be colored with any transparent pigment or aniline color. It should be dabbed on with a pad of raw cotton. Sugar of lead, mixed with equal parts of damar varnish and turpentine and made quite thin may be stippled on. Or mix one part white lead, dry, with three-quarters parts varnish and one-quarter part turpentine, with a little sugar of lead for a drier. Apply in a thin coat, with a broad bristle brush, and spread it evenly. Such frostings may be removed with ammonia or other alkali. Mix whiting with pale japan one part, and raw linseed oil two parts, thinning out with turpentine and applying with a bristle brush; enclose some cotton wool in a rag and rub or dab the coating.

The above formulas may be used on window lights in situ, but the more liquid formulas require that the sash or lights be taken out and laid down. Thus Epsom salts with gum arabic water. Make a saturated solution of the salts and add gum water, as a binder; lay the glass on a level table, and apply the liquid with a soft, broad brush. The slower the drying the finer the crystallization, hence the room ought not to be too warm. After the coating has stood for some time apply a sheet of blotter paper to it, to absorb excess of moisture; do this very carefully. This will hasten the process. When it has become perfectly dry apply a thin coat of damar varnish, colored if you wish, with aniline dye.

For a more permanent frosting use sugar of lead, mixed with raw oil and a little damar varnish. Or zinc sulphate three parts, magnesia sulphate three parts, dextrine two parts, and water twenty parts.

For imitation ground glass first apply a coat of damar varnish, and sprinkle over it some fine pumicestone; this will permit light to pass through the glass. Or melt one part beeswax in ten parts turpentine, and one part each of driers and pale varnish. Coat the glass on the outside, and just before it is dry dab it with a wad of raw cotton. Coloring may be used if desired.

Thin out sugar of lead with turpentine and thicken with gilders whiting; apply with a brush and stipple evenly.

**ORNAMENTAL MOCK FROSTING.**—Mix sweet milk with best bolted whiting, making a mixture like oil paint in consistency; strain it. Make the glass clean, and lay the coating on even and thin, so that it will not run. Stipple with a large stencil brush. When it is dry it should appear even and solid. Then it is ready for the ornamental work. Plain lines may be run with a boxwood liner and a straight-edge. Boxwood cuts a cleaner line than any other wood. Shape a piece of this wood to form a chisel, making a sharp, broad point. Make it the width that you wish the lines to be. Dampen a sponge a little with the water paint, and dab the color on, when you apply the paint. Stencilling may be done by rubbing out the color or paint with a stencil brush, using for this purpose a small brush, slightly dampening it. After having run the lines and brushed out the design through the stencil plate, give it a coat of pale, hard-drying varnish.

**STENCILLED EMBOSSED WORK.**—This is useful for transoms and other glass where it is desirable to obscure the glass and yet allow light to pass through. Glass office doors are usually done this way. But the glass must be removed from its place, door or transom, and then be matted or embossed. Or only a part of the glass may be obscured, leaving the rest to receive the lettering and fancy work.

For a permanent work see same title under another heading.

**IMITATION EMBOSSED GLASS SIGN.**—Lay a sheet of heavy tinfoil on the glass that you are to letter; place a piece of paper on the tinfoil and press it out smoothly. Then with a stencil containing the letters pounce same onto the foil. Cut out the letters and remove them. Coat the exposed letter parts with damar varnish or Venice turpentine; set it away to set. Next stipple with a stiff bristle brush, to imitate the embossing. Set it away to dry. When it is dry strip off the foil and gild the letters twice, but don't try to burnish them. Back up and leave a plain edge of gilding around the letters, outside of the stippling. When the backing is dry clean off surplus leaf; shade letters if you wish.

**MOCK EMBOSSING.**—While sign painters usually have their own particular method of doing this work, yet in general the procedure is essentially the same; all methods are based on the fact that when varnish is applied to glass and gilded on the varnish kills the luster

of the gold, producing what is called a matt effect. That is the imitation of the matt produced on glass by acids or grinding.

For this imitation matt work a pale varnish is considered the best.

Clear spaces, ornaments, letters, etc., may be made on ordinary ground glass by using varnish. Flowers, landscapes, or figured subjects, may be produced by working all the colors in varnish. No white lead is used, for all tints of colors may be obtained by mixing tube colors with varnish, and painting in a transparent manner.

### ENAMELLED OR PORCELAIN, GLASS, ETC., LETTERS

To set out porcelain letters on a window draw the lines with a chalked line, and curved lines with a piece of prepared chalk and a string. This latter is done by holding the one end of the line with the left hand, at the proper point for making the curve or half-circle, with the other end and the chalk in the right hand, or vice versa, as you prefer. Unless the glass is clean it will not take the chalk well. Some first size the glass with vinegar. But if not expert you had better use the amateur's method, which consists in laying out the letters on paper and drawing lines around them, then fastening the paper to the glass on the inside and placing the porcelain letters to the glass outside against the paper pattern. You will find this a very easy way. It is easier to space the letters on the paper than on the glass. Don't crowd the letters, and be sure to space them nicely.

The glass must be perfectly clean if the cement is to stick. The cement may be bought, or you can yourself prepare it. Take white lead in oil two parts, dry white lead three parts, and mix with copal varnish to a paste, about like putty; work it on a stone slab or plate of glass until quite smooth; do not use it too thin.

If the letters come loose before they should the fault may be due to water having got access to their backs. When cementing them on use plenty of the cement, and the excess may easily be removed. When a letter becomes quite loose it must be taken off and the glass cleaned under it and the cement be again applied. If the letter has its enamel broken off a little it may be repaired by a putty made thus: Mix together 5 parts each of copal and damar varnish, 4 parts turpentine, and enough alcohol to form a thick liquid. Let it stand two or three



weeks, then add 6 parts of dry zinc white, and work the whole to a smooth putty. When wanted for use heat it, for it must be used warm, otherwise it cannot be smoothed out. When it has become cold on the letter polish it with soft rag.

To remove these letters from glass apply alcohol around the edges, to soften the cement, then with the point of a pocket knife very carefully raise the edges until the letter is loose. Or, heat a sad iron and hold it near the letter. The first method will raise the edges of the copper letters, though they may be hammered down again; but with the heat method this will not occur.

To attach brilliant letters they are placed on the inside of the glass, which exposes the gilding of their insides to view on the outside of the window. Two coats of a thin cement are used, and the cement is colored to harmonize with the gold.

To cement brass to glass a very elastic cement is used. Melt together 5 ounces of rosin, and 1 ounce of beeswax with gentle heat, then stir slowly in 1 ounce of dry Venetian red; remove from the fire, and when the mass is cool it is ready to use.

**GLASS LETTERS.**—Glass letters are made for use in windows, and for making signs on plate glass of various sizes. House number glass plates also are made. Double thick glass, with bevelled edges, is used, and holes are provided for attaching with.

There are various forms of letters, numerals, etc. Such letters are made in opal, gold and silver. The convex letters have the gold, etc., burned in the glass, with a mirror effect. The letters are cemented to any sort of a surface. Unlike the brilliant letters, these go on the outside, on the glass, etc.

## CLEANING AND RENOVATING OLD SIGNS

**RAISED GOLD LETTERS, SMALTED GROUND.**—Brush the gilt letters with a soft brush to remove dust, then wash with pure white soap-suds, using a soft brush, then rinse off with clear water. Be careful not to scratch the gilding. A wad of raw cotton is useful. Then, if the gilding does not look bright, wash again, this time with water made acid with muriatic acid, which is to cut any remaining grease or grime and restore the original color of the gold. Then rinse off with clear

water. Some, after this process, rub the gilding with a mixture of equal parts of glycerine and water, using a wad of raw cotton and rubbing the preparation into the gilding. Acid removes dirt or grime, etc., but does not give the original luster of the gold, and the glycerine preparation is to do this. After cleansing the gold restore the smalted ground by applying a thin coat of flat black color. It may be necessary in some cases to remove the old smalts and re-sand it.

Another plan is as follows: To two quarts of coal oil add one-half ounce of bichromate of potash and shake together well; brush this over the old smalted ground. The finest black job of smalting will in course of time become a dead gray. Such a case may be treated with a black paint made from turpentine one gallon, dry lampblack of best grade one-half ounce, and dry cobalt blue a teaspoonful, or about an ounce. For maroon colored smalted ground, add a little cobalt blue to Indian red and thin with turpentine, a little japan drier in all these cases. For green smalts ground use dry chrome green, and for red, two coats of flat red.

First of all dust off the job. Sometimes washing with soapy water, then rinsing with clear water, will make a great improvement, though a coat of thin color also is generally necessary. In a few cases if the job is not very bad just the clear turpentine will be enough to restore freshness.

Dark spots on gilded letters are usually impossible of removal, as the trouble is due to inferior leaf or poor workmanship. If the gold leaf contains copper it will tarnish. Re-leafing is then necessary.

If the gold leaf is pure then the tarnish may be removed by washing off with acid water, done very carefully; use muriatic acid, added to water to make a sour liquid. Some prefer alcohol, used by means of a sponge, while others claim turpentine is best. But the most generally employed cleanser is acid water. If you try alcohol or turpentine, then don't wash it off afterwards, as you would with acid.

Cyanide of potassium will often remove obstinate stains from gold-leafed objects—one-half ounce of cyanide to the pint of soft water. Let it dry on the gilding, followed by brushing off with prepared chalk. What is described as a harmless cleanser is made as follows: Slake an ounce of fresh quick lime in a little hot water, then slowly add 20 fluid ounces of boiling water, to form milk of lime. Then dissolve in

another vessel 12 ounces of pearlash in 30 fluid ounces of boiling water and mix the two solutions, covering up the vessel for about one hour, occasionally shaking it; when cool decant the clear liquid and apply it to the gold leaf with soft sponge or raw cotton until the metal is clean, then wash off with clear water. Another detergent may be made by dissolving 7 ounces of bicarbonate of soda, 7 ounces of chloride of lime, and 2 ounces of table salt in 3 half-pints of soft water, and keeping it in a stoppered bottle until wanted for use. Use same as indicated for the other formula.

**CLEANING BRASS SIGN.**—There are pastes on the market for cleaning brass sign plates, these usually containing an acid. Oxalic acid and whiting make a very good paste. The ingredients are dampened with water and applied, to remain until dry, after which the powder is rubbed off with a cloth and the plate polished with sweet oil and Tripoli powder. This will keep the metal from tarnishing for some time. There are some metal polishes that brighten the metal, but the luster too quickly passes away. Soft soap and pulverized rottenstone make a good cleanser.

**REMOVING OLD SMALTS.**—If the sand is old and dry it can be removed with a plane bit or other scraper. If not old the blow torch will soften the paint, after which it can easily be scraped off. Or pour some alcohol on it and set fire to the liquid; or use benzol or other paint remover. Alkali remover not advised.

**CLEANING TARNISHED ZINC SIGN.**—Rub the plate with a mixture of 1 part of muriatic acid and 12 parts of water, using a soft rag. After which wash off with clear water and rub dry.

## EQUIPMENT FOR SIGN SHOP AND OFFICE

THE equipment for properly conducting the work and business of a sign painting concern varies, of course, with the extent of the business done. The big shop needs swings, block and tackle, ladders, etc., for hanging large signs. The small shop will usually do only small jobs, to be called for or maybe be delivered by a boy. But both large and small shops need in common a number of tools and brushes, making quite a large list. Easels of different sizes, tables, T-square, gasoline torch, paint scrapers, putty knives, steel square and straight edge,



large and small dividers or compasses, two-foot and other rules, saw, hammer, nails, screws, etc.

Then the materials, such as white lead, colors, oil, turpentine, japan, oil and gold size, tube colors, dry colors, smalts, whiting, chalk crayons and charcoal sticks, etc.

Of brushes there are camel hair lettering pencils of different sizes, for oil colors. Black sable lettering pencils, in quills, of all sizes, though those most commonly used are Nos. 8, 10 and 12, the latter a special size, used mainly for cutting-in on fascia boards. Red sable lettering brushes in quills, different sizes, used in general lettering, and liked by experts because they carry heavy color well, their spring not being affected thereby. It is a very desirable pencil. Flat camel hair lacquering brush, assorted sizes, for large lettering on oil cloth, muslin, and smooth board surface. Flat red sable lettering brushes for oil cloth and fairly smooth surface, also muslin. A good brush for free-hand and single stroke work, and useful also in water color lettering. Artists' flat bristle chiseled bristle brushes, used principally for pictorial work, etc., on bulletin and wall work. Flat bristle chiseled varnish brush, sizes 1 1/2 to 2 inches. Used in painting small boards and board work in general, and for cutting in on wall and bulletin work. Flat bear's hair, or fitch hair, brush, useful for large lettering on brick wall work, large muslin jobs, canvas and bulletin work of large dimensions. Assorted sizes.

There are other kinds of pencils and brushes, according to the different catalogs, but those enumerated are sufficient and will be found acceptable to most experts. There are in addition house painters' brushes, varnish brushes, etc.

The sign shop will need at least two horses or trestles, about 28 inches high. At least one easel for small work, with a double easel for large work. The latter are made from 2 by 4 scantling, the easels are 7 feet long and 5 feet high. In the uprights, holes are placed 5 inches apart, for pegs, on which the sign board is to rest. For very large work stilts are required. These are pieces of scantling 2 by 4, in length a little more than the height of the shop ceiling; along the ceiling is fastened a strip of wood notched four inches at intervals of 6 feet or so; in these notches the stilts are placed. Stilts may also be stood against the shop wall, to hold the sign board. For this purpose you may have lengths of from 6 to 12 feet, to accommodate the various sized signs.

Thus the shortest stilt will hold a sign; the next in size will hold another; and so on, until you have several signs thus securely placed out of the way. They are very handy.

A table with a top covered with zinc will be found a convenience for mixing and grinding color under the palette knife. This table may be 40 inches high and the same across its top. The feet of the table should have ball bearing casters, so that it can easily be moved about the shop. Have also some shelves under its top. A few small stands will be found handy, for use when working at an easel. If you do show-card work you will need a bench for that. This should be a table with top 3 feet wide by 5 feet long, hinged to the wall or sill of a window. It can have a leg support, notched strip on the floor, and the leg placed at any desired angle in one of the notches.

For muslin signs you will require a muslin board, 6 1/2 feet by 25 feet long, this to be placed in ways slanting from the ceiling outward, so that paint will not drop from your brush on to the muslin below. Fasten the muslin to the board with steel clips: This board works up and down in the ways. An upright reel at the left of the muslin board will hold the roll of muslin.

A handy rack for holding the stock of raised letters may be made by making an upright frame 6 by 10 feet, from 2 by 6 inch plank, with cross pieces at the bottom to form the base. For holding the letters string copper wires across, instead of wooden shelves, two wires forming a shelf, placed 5 inches apart, the shelves 4 inches apart.

A smalt cloth is useful. It may be of such dimensions as your shop will accommodate, and can be made from 4-ounce duck; about 40 inches wide, and any desired length up to 60 feet. This cloth catches the sand or smalts when you are doing work of this kind.

A sign painters' straight-edge may be made by dressing a lath true and thin. Make a hand-hold from a piece of board 1/2 or 3/8 inch thick and about 6 inches long. Get the exact center of the lath, also of the hand-hold, and drive a nail so that it will enter at the center of both, fastening the hand-hold to the lath; then bend the lath to form a slight bow, then drive two nails in the hand-hold, one at each end; the slight bow in the straight-edge is flattened out when you hold the latter on to the work, rendering it less likely to slip under the hand when drawing a pencil or crayon along it than it would be if perfectly flat; the hand-hold is convenient for holding the straight-edge down.

A handy chalk line may be made for muslin or banner work by attaching a fish hook, its barb filed off, to an end of the line, and which can be inserted in the work at one end, enabling one man to run the line; in most work of the kind it requires two men to manage the chalked line. In some cases the brad awl is best.

CARE OF TOOLS AND BRUSHES.—Brushes are very costly, and it would be wrong not to take the best possible care of them. This not only saves you money, but it gives you better tools to work with, with which to do better work. These brushes are made for use in water or oil color, but not for both. Hence it is wrong to misuse them in this respect. When done using a water color brush or pencil wash it out in clear water until clean. Red sable riggers and flats are used in water color work. Lettering brushes and pencils used in oil or japan color should be washed with benzine or turpentine and greased with some non-drying oil; smooth the hair out evenly and place it flat in a tray. Bristle fitches and flat bristle brushes wrap separately in paper, using a ribbon of paper and wrapping tightly towards the ends of the bristles, bending the paper a little over the ends of the bristles, to preserve the shape; then stand it in a cup of turpentine; thus it will be prevented from resting on the tips of the bristles. It is necessary to keep the point of the brush in shape. Paint brushes should be wrapped in the same way and be placed in a trough in turpentine, and not water.

Dirty pencils may be made clean by washing out in chloroform and rinsing out in turpentine. Then grease and lay away. Dirty bristle brushes may be cleaned with fusel oil or paint remover; soak therein until the old paint softens, then scrape it off and rinse brush in turpentine. If your lettering pencil should fall on the dirty floor clean it by holding it over a cup and pouring benzine over it. A bent pencil may be straightened by letting it soak in turpentine until the hair softens, then run it under the finger on a warm iron. This will remove the kink, then it may be greased and laid away.

Keep shop and tools clean always. Have a place for everything, and everything in its place.

OFFICE STATIONERY.—It is always in order, in almost any line of business, to use good, refined, attractive stationery for business correspondence, etc., well printed and on best linen paper. Avoid all commonplaces, such as "Do you believe in signs? We make 'em." Cut out all but bare requirements of a letter head, envelope, bill head,



statement, etc. We have seen many specimens of shop stationery, but the worst seems to be that containing a photo of the sign man's face, or the back of his head. Get samples of stationery from the printer and select such as appears to be refined and good from a good business standpoint.

A typewriter will prove a very useful and paying tool in the office; it is easily operated and does better work than most penmen are capable of. Besides which it looks more like up-to-date business. We have seen in some big sign shops also an adding machine, but this can hardly be called necessary in most shops.

It would also be well to secure from various sign painting shops samples of the forms they use. Here is one such form, useful in any sign shop:

#### SPECIFICATIONS FOR SIGN

PHILADELPHIA, PA.,.....19.....

NAME.....

ADDRESS.....

Sign to read.....

Double or single face.....

Length of sign.....Width.....

Vertical or horizontal.....

Letters..... Size..... Color.....

Background preferred.....

Material.....

To be delivered.....

Remarks.....

.....

.....

SIGNED.....

Please outline sketch on opposite side.

A SIGN WRITER'S KIT.—A kit is a travelling sign shop; the kit may be one of the ready made affairs, and which are very complete, or you can have one made. One measuring 12 inches in length, 10 inches in height, and 6 inches in depth will be large enough to carry enough

for average ordinary use. Here are the contents of such a kit: Six cans with a capacity each of one gill, these to contain turpentine, japan, rubbing varnish, boiled oil, japan gold size, and alcohol. Such cans are about 4 inches high, 2 inches wide, and  $\frac{3}{4}$  inches the remaining way. They have screw tops, and take up little space. Then there is a brush case containing 15 assorted lettering pencils; a mahl or rest stick, with joints, so that it occupies little space; an aluminum palette; a tube each of lampblack in oil, drop black in japan, chrome yellow, medium in japan, white lead in oil, Prussian blue in both oil and japan, respectively, chalk crayons, say one-half dozen, a chalk line, charcoal, an alcohol lamp, a vessel for gilding size and a brush, a small quantity of absorbent cotton, pounce bags, for white and colored, two-foot rule, a small bottle of damar varnish, one of sperm oil, one of slow oil size, one of asphaltum, some gilding tips, six-inch dividers, sheet gelatine or gelatine capsules, and finally a tube each of these oil colors: English vermilion, deep shade, mauve, Vandyke brown, chrome green, medium, burnt sienna, burnt umber.

A good level-straight-edge is required.

### ALUMINUM, SILVER AND NICKEL LEAF AND BRONZE POWDERS

ALUMINUM leaf and blue make a very attractive combination. It is handsome also with green of certain shades, but with these it should always be shaded with black. On black ground this leaf is cold and tame, but on a brown ground it is more effective. When used on a bright straw, orange or cream ground aluminum leaf is nearly as attractive as on blue; its effect being nearly as good as gold leaf. Gold and aluminum leaf are often used together on ornamental work, and the combination is good. In connection with dark shading it does well on light tones of green, blue or stone color. It is too stiff for glass work, in this respect being inferior to silver leaf. Aluminum leaf does not tarnish as silver does, and it is less expensive.

Aluminum does not agree well with every color, simply because it does not possess color, as gold does. Aluminum is white and cold. But it has the quality of borrowing color, as instanced when it is surrounded with orange color, when it fairly glows. An aluminum

letter looks well when shaded with a warm sienna tint; fine-line shading is better than heavy-line. A plain double-shade looks well too. This is two shades of the same color running parallel. When this is done, place the lighter shade on the outside. The double shade may be made by running the light color up to the letter, and, when dry, paint in the darker shade to cover half of the first or light shade.

The effect of varnish on aluminum leaf is to make it appear as white paint; hence it is not desirable. The ground should be made flat for aluminum letters. If the ground is to be varnished first lay the letters and then varnish around them.

**SILVER LEAF.**—This leaf is very little employed in lettering, since aluminum leaf does so well in its stead. It is too heavy to handle well, for one thing, being particularly difficult to lay on glass; it shows the joins very much. It is never brilliant. Compared with gold, it looks cheap, much more so than aluminum.

Laying silver leaf is done about the same as gold leaf, but as it is so much heavier than that leaf the size must be accordingly stouter, to hold it fast. For glass work the size is made from isinglass, and made as heavy. An English expert tells us that the size does not need to be so heavy, that a weak size will do very well. But any heavy leaf obviously needs a heavy size, and experience confirms this view. After the leaf has been applied and is dry it is to be rubbed with cotton wool, the same as gold leaf; then another leaf is applied, and this also is rubbed with cotton wool. Touch up faulty places, and back up with lead color and varnish, using hard-drying varnish. Never press the leaf with the thumb, as that will produce a spot. Use the ball of the hand, and press gently but firmly, and where two edges come together and lap pound lightly with the ball of the hand. This method is also used in the laying of aluminum leaf.

As it is impossible to see the outlines through either silver or aluminum leaf, when double-leafed, a pounce must be used. Both silver and aluminum leaf leave ragged edges on the letters; they will have to be trued-up with a steel blade, one that is bevelled on one side or edge; this steel edge is laid on the edge of a letter and the ragged leaf is rubbed away, even with the edge of the steel. This gives a perfectly true edge. To remove any other surplus leaf apply an acid water, made by taking a teaspoonful of hydrochloric acid and diluting it with a gill of soft water; wet a small bit of rag with this and rub the leaf away. Do not



get the acid-water too strong, for it will cause the edges of the leafed letters to curl. After removing the leaf wash off with clear water.

The size for silver leaf for wooden signs may be made by mixing equal parts of coach finishing and good rubbing varnish. Tint with white. Varnish is applied over silver leaf to protect it from the air, which would otherwise tarnish it. If it is not desirable to have a varnished sign, then use aluminum leaf instead of silver. In this case use fat oil size. This latter leaf requires a rather softer size than either gold or silver leaf.

**NICKEL LEAF.**—What has been said concerning silver leaf will apply as well to nickel. Use the same size as indicated for silver and for aluminum leaf. It is advised to add a little white to the size used in any of these white metals. When using any of these leafs on the outside, and where it is desirable to get the work done quickly, on account of dust, etc., the size may be hastened by the addition of a little japan gold size. While the size does not have to be as dry as that for gold leaf, yet it must not be wet enough to cause the leaf to slide, or to cause the size to come through the leaf. As soon as the size is set firmly lay the leaf. Experience must be the teacher.

**ALUMINUM BRONZE.**—Of course it is not bronze at all, but simply powder. The coarser powder shows up more brilliant than the fine. But if the powder is to be mixed with a liquid for application, then use the fine powder. The coarse does best when dusted on.

**BRONZING LETTERS ON GLASS, OUTSIDE.**—Thin some white lead, that has been ground in oil, with equal parts of boiled oil and quick rubbing varnish. If a hurry job, add a little gold size japan. When this size has been applied and set with proper tack rub on the bronze and rub well into the paint. Make a velvet-covered pad with cotton wool filling, for rubbing on the bronze. Allow the work to become hard-dry, then outline the letters, or shade them, as you prefer. The temperature should be such that you can do the work in comfort, or such as will best conduce to the drying of the job.

A sign painter tells us that he never had success with white lead as a size for aluminum bronze. His formula calls for quick drying varnish  $\frac{3}{5}$  part; chrome yellow in oil,  $\frac{1}{5}$  part; turpentine,  $\frac{1}{5}$  part. He adds that this size will take the bronze in an hour, and in warm weather in less time. Our objection would be to the color, yellow. Another formula: Take some zinc white and tinge japan gold size with it,

adding also a little of the aluminum powder. Mix together and add a few drops of rubbing varnish. Letter the glass with this, and when on the right tack rub on the powder.

Some painters mix equal parts of rubbing and coach varnish, with a little zinc white, to stain or whiten the varnish. Others, again, prefer equal parts of coach varnish and gold size japan, adding enough white lead, in oil, to form a rather stout mass.

Gold size used alone has the bad habit of cracking.

Before beginning the job clean the window glass and have it quite dry also.

ANOTHER FORMULA.—Mix tube-color flake white with pale gold size japan and make a fairly thick paint; add enough drop black to impart a pearly tint to the mixture.

STILL ANOTHER.—Mix white lead, in oil, with good copal varnish and a little japan drier. Thin with turpentine.

When lettering on windows do the work on the outside, for it cannot be burnished or polished on the inside. Form the letters carefully, and shade them from the outside. Although the work may be done on the inside, it is better done on the outside, as it will look better so. The aluminum powder does not look as attractive done inside as when done outside, for you cannot burnish it there.

Use a quick size on outside lettering, to get the work out of danger as soon as possible.

Mix the shading color with varnish; japan color is too brittle.

Use the same kind of color when doing the job on the inside. First outline the letters with black, and then put in the shade. When all is dry mix some aluminum powder with size, made to dry quick, and fill in the letters. When this has the right tack rub on the aluminum powder, let it dry, then back-up with a sharp lead color. For first-class work, let it stand several days, then apply a coat of spar varnish, which may be extended beyond the letters  $\frac{1}{8}$  inch, to hold the leaf.

On inside work a little aluminum powder is added to the size, but on outside work add a little flake white.

Quick work demands a size made from spar varnish, whitened with white lead. The lead is a good drier. Zinc white is not.

If the lettering is to be varnished don't use oil size.

Outline and form the letters with perfectly true edges, then the out-

line or shading may go on. Shading, lining and lettering are all best done on the inside of the window.

**TO LETTER A SECOND OR THIRD-STORY WINDOW.**—To letter with either silver or aluminum leaf the process is very similar to the gold leaf process. The glass must be clean, and the lettering must be backed-up with color containing little oil. Lay the work out with chalk, on the outside of the glass, but lay the leaf on the inside, guided by the lay-out on the outer side of the glass. When the leaf is dry you will not be able to see the lay-out, as when gold leaf is used. But take a fine tooth comb and break off the two large end parts, and with this comb the leaf with down strokes until you can see the lay-out. Then back up the letters with color, when done with the lettering, and no one will be able to see the fine comb marks from the street. Then finish with an edge line.

Another way is, to carefully chalk your lay-out on the outside, and put on the edge line before laying the leaf. But there is an objection to this method; the size is liable to crawl from the edge line and cause trouble when laying the leaf, thus marring the work.

As stated elsewhere, as it is not easy to see the lay-out, particularly in double-leafed work, better use a pounce on both front and back.

**LETTERS IN ALUMINUM BRONZE ON GLASS.**—For inside of glass use the very finest powdered aluminum bronze. Mix the bronze with damar varnish as thick as it will stand lettering with camel hair pencil. Lay out the letters on the outside of the glass with chalk. Be sure that the inside of glass is clean. Apply the aluminum bronze paint on the letters, and when it has the proper tack apply dry aluminum powder to the back of the letters. Give it all the powder it will take, using a cotton pad or piece of velvet. When this is dry dust off loose powder. Now mix some of the bronze paint with a little zinc white in rubbing varnish and boiled oil, equal parts. Apply this to the letters. When this is dry line or shade the letters; when this is dry apply a coat of white lead mixed in spar varnish or coach varnish and raw oil, equal parts. This last coat will require some time for drying, but once dry it will stay.

If the letters are to be on the outside of the glass do the letters with a mixture one-third zinc white and two-thirds aluminum bronze, mixed with two parts quick varnish or japan gold size and one part boiled



oil. When this is set, though not hard-dry, apply dry aluminum bronze to the job, using cotton pad wrapped in a piece of velvet; rub on all the letters will take. Dust off lightly, then line or shade with color mixed with boiled oil and a little japan or japan gold size.

**SILVER LEAF LETTERS ON GLASS.**—If on the inside of the glass, make a drawing of the job, in full size, on manila paper, preferably. Prick the outlines with a coarse needle, making the holes close together. Rub off the back of the pattern with No. 2. sandpaper, to smooth off the roughness of the pricking. Now put the stencil pattern exactly in place on the outside of the glass, and rub dry whiting over the same. This will leave a stencilled copy of the design on the glass.

Dissolve in one pint of hot distilled water eight No. 4 gelatin capsules, and strain through a fine clean cloth; add a few drops of grain alcohol. Flow the size on with a wide, flat camel-hair brush, apply the silver leaf with a silver leaf tip (this is the same kind as used for gold leaf, only heavier). Lay the leaf on the glass, covering all the letters and lines commencing at the top of the work. When dry, rub lightly with absorbent cotton. Then go over the job with size and patch any holes or breaks. Let this dry, then apply a coat of the size all over the work. When dry, rub lightly with cotton. Placing the paper pattern face to the glass exactly as before, on the inside, rub whiting over it, or dry Venetian red, so that the letters will be marked on the silver. Back the letters with black mixed in good rubbing varnish. When hard-dry clean off surplus leaf, then line or shade letters with oil colors, finishing with a backing of white lead mixed with varnish and boiled oil.

**VARNISH ON SILVER LEAF.**—Silver leaf will tarnish if exposed, and varnish does not do. The only place to use silver leaf in lettering is on the inside of glass, where it is protected from the air, etc.

**TO MAKE BRONZE STICK TO GLASS.**—For gold bronze take chrome yellow ground in japan and mix with quick-drying rubbing varnish. For silver or aluminum bronze take white in japan and add about a teaspoonful of it to one-half pint of the varnish. Mix thoroughly. If too thick, thin out with turpentine. Either apply this to the glass or do the lettering with it. In about one-half hour this will be tacky. Then brush over it with a cotton or velvet pad. This job will stand for years.

To add to its attractiveness outline letters with red, or shade with same. The above method may also be used for board signs.

## HOW TO CHARGE FOR YOUR WORK

It is impossible to give a price list on sign work that will be found useful in all localities, hence when prices are given it must be understood that they are approximate at the best, and merely serve as a guide. It is advised that you make up a price list yourself, based upon actual work done and taking into account the cost of materials and work. For example, take the cost of the sign board, of the painting thereof, and the lettering, also the time per hour. This will cover cost of stock and labor. Add to this 50% for overhead charges, making the gross cost. Then add 50% of gross cost for shop profit.

Aside from the matter of price there is much useful information to be found in the following pages that will be of helpful interest to the beginner in sign work. We will take the various kinds of sign work in alphabetical order.

**AWNING SIGNS.**—The annexed figures are based on six-inch letters, adding 10% for each additional inch in height. This table governs lettering on awnings for stores, wagon covers, wagon umbrellas, etc. Allow a proper discount for quantities, according to size of contract.

Lettering, one color, per running foot.....	12c.
Lettering, two colors, per running foot.....	20c.
Lettering, three colors, per running foot.....	24 to 30c.
For shading add 25% to above prices.	

**BRASS SIGNS.**—The price will depend upon character of work, whether acid-etched letter filled in with cement, or shallow etched simply painted-in. Price for former work may run from \$6.00 a square foot to \$8.00, according to size, or whether one-foot square or more. Smaller signs may run from \$4.00 to \$8.00 for one-line letters. For two lines add one-fourth to one-third more. For painted-in letters allow about 25% less. Raised letters are charged for by the upright inch, say 70c. Raised border charge for by the running foot, say \$2.00 per foot. For bevelled brass sign, for bevelling, charge by the running foot, say 70c. Minimum charge not less than \$2.00. Doing an old brass sign over, which will require repolishing and filling, not less than \$2.00 per square foot.

BOARD SIGNS.—The following list is based upon a good job, three coats of pure white lead and pure raw linseed oil paint, properly applied. The prices on one and two coats will be lower, of course. If you furnish the irons and board and hang the sign it will all be extra, getting amount by taking cost of goods and time. If letters are shaded one color charge 25% extra.

White ground, black letters, running foot.....	\$1.00
Silver or aluminum leaf, running foot.....	1.50
Ordinary For Rent signs, each.....	2.00
Plain lettering, plain ground, square foot.....	.50
Same, large boards, square foot.....	.40
Gold leaf, painted ground, square foot.....	.60
Silver or aluminum leaf, cut-in, plain ground, per square foot .....	.40
Plain lettering with paint or cut-in, square foot.....	.20

BOARD SIGNS, RAISED LETTERS.—Prices the same as painted-letter board sign. Wooden letters extra. Gilding rounded or bevelled edge letters 20c to 30c, according to size and thickness of letter, per upright inch. For aluminum or silver allow 40% off the price of gold work.

#### BOARD AND GALVANIZED IRON FASCIA SIGNS.—

	<i>Per Lineal Foot</i>		
	<i>Gold</i>	<i>Silver</i>	<i>Paint</i>
Up to 6 inches wide.....	\$1.00	\$1.00	\$.60
Up to 12 inches wide.....	1.30	1.00	.80
Up to 18 inches wide.....	1.70	1.50	1.20
Up to 24 inches wide.....	2.00	1.70	1.40
Up to 30 inches wide.....	2.50	2.00	1.60
Up to 36 inches wide.....	3.00	2.50	1.80

The above prices are based on smalted ground and one-line lettering. After the first full line add 30% per foot for additional work in gold. For silver add 25%. For paint add 20% per foot. For re-painting deduct 20%. If customer furnishes the board deduct 20%. If finished in varnish add 30%. If gold ground add 75%. If done on both sides add 75%.



CARVED RAISED LETTERS ON FASCIA BOARD, WITH BLACK SMALTED GROUND.—

	<i>Per Lineal Foot</i>
3-inch letter up to 14 inches wide.....	\$2.50
4-inch letter, 14 to 18 inches wide.....	3.00
5-inch letter, 18 to 24 inches wide.....	3.50
6-inch letter, 24 to 30 inches wide.....	4.00
9-inch letter, 30 to 36 inches wide.....	5.00

Letters to be gilded in XX gold leaf, deep shade. If in silver deduct 20%. If two lines of letters add 75%.

To illustrate difference in rates in different localities, taking the established association prices given on 60 square feet of sign work of a given description in two large cities, east and west, the western city charges one-third more than the eastern city. Moreover, in the former case two coats of paint are included in the contract, and in the other only the lettering is done, painting extra. I have decided to omit lists of prices, with the sizes of signs, in this edition, as being of no practical use.

BULLETIN SIGNS.—There is the same degree of indefiniteness about prices on bulletin sign work as attaches to all other forms of sign work. Some painters make a bid on a job of bulletin work and base that bid on guess-work, a very crude way indeed. Others will estimate by the square foot. One of the largest contractors for bulletin sign work tells me that in most if not all cities the price for a bulletin sign includes the rental in all cases. Prices vary from 50c per running foot to 80c, per month, for all ordinary locations, on a yearly contract, including painting and repainting. Especially desirable locations will run up the price accordingly, and on less than yearly contracts the price will be proportionately higher. For these figures the work must be strictly first-class in every respect. Prices also vary as to city. Equal quality of work will bring more or less, according to local conditions. Where the territory for bulletin work is large, as at Cleveland, Philadelphia, Buffalo, etc., rentals are lower, and hence prices are lower. Prices are higher around Pittsburgh, for instance, because the surrounding country is very hilly and broken. Hence prices there are higher, it being simply a case of demand and supply.

As regards the mechanical side of the matter, put up as good a board as you can get built, then paint it as good as possible. The quality of your work will regulate the price. If work and location are good the advertiser will pay liberally.

Where a bulletin board is divided into many sections the entire yield will be better than when one party buys the board. Doing small sections will of course require more time than doing the sign as a whole.

One bulletin painter says that from \$30 to \$60 a year for a section 9 by 12 feet would be a fair price, with an allowance of one-third off for renewals, where the original painting is to continue for another year.

Pictorial not duplicated must be charged for at higher rates than plain work. Certain parts of the space will be more valuable to an advertiser than certain other parts. The top, for instance, is more desirable than the bottom position.

Be sure what work you are to do, and where it is to go, before concluding a contract.

Bulletin signs may be bought ready made, in sections ready for the posts; they are sheet steel.

Sizes run from 4 by 6 feet up. Charge so much each up to those 10 feet in height, when the charge may be made by the running foot, say \$4.00 per foot. For each foot above ten add 25c per running foot.

When bulletins are sold in lots a discount may be made, say 10%. If you are not to erect the bulletin boards deduct say 20%. The cost of rent of location must be added to the charge. Pictorial backgrounds are to be charged for at the rate say of 10%.

Bulletins ranging from 8 by 12 up to 8 by 40 feet charge at the rate of from \$3.00 to \$4.00 per running foot.

CANVAS SIGNS ON FRAMES.—Three feet wide or less \$1.20 per running foot, up to 25 running feet. After first 25 feet charge 36c per foot. If wider than three feet estimate at 40c per square foot, up to 75 square feet. After first 75 square feet charge 30c per square foot. For gold lettering charge 10% less than for similar work on board or metal.

CAMPAIGN BANNERS.—For street display, style, ribbons, and portrait panels of canvas sewed on net, 14 by 30 feet, \$3.00 each. Or charge say 60c per square foot.

DRUM SIGNS.—Deduct 30% for lots of six or more. Deduct 10% for flat zinc. Deduct 15% if done entirely in silver. Add 30% for every six inches over three feet in width. Deduct 15% for repaints. Add 75% for gold grounds. Add 30% for silver grounds. Estimate bracket signs, double face, same as a pair of drums, less 15%.

GLASS SIGNS.—

Lettering in gold leaf, up to 6-in. height, per running foot .....	\$1.50
Lettering in silver, up to 6-in. height, per running foot .....	1.50
Lettering in aluminum leaf same as for silver.	
Lettering in gold, from 6 to 10 in., per running foot .....	2.00
Lettering in gold, from 10 to 14 in. height, per running foot .....	3.00
Lettering in silver, 6 to 10 inches.....	1.50

For shading one color add 15%. Add 10% for each additional inch in height. Add 25% for embossed work. Add 10% for blended work. Add 20% for gold outlining with transparent center. For colored background, stippled and varnished, charge per square foot, extra, 10%. Gold striping on panel, according to width of stripe, charge from 15c to 30c per running foot. Silver or aluminum striping same, less 20%. A sign painter says that laying silver leaf with water size, as done on glass, is worth the same as for gold leaf, deducting the difference in price of leaf. He adds that gold lettering is worth from 20c to \$2.00 per letter, according to amount of letters. Another sign painter figures by the running foot, but adds that it makes the totals look big to the customer, hence he finds that by charging 16c per upright inch he will be satisfied, and that money can be made at that price. Of course it is below the regular price, a 6-inch letter making 96c, but it all depends upon circumstances. Some work may be done at a profit at \$1.00 per foot per 6-inch letter. Some do charge \$2.00. And the amount of lettering done affects the charge, for where we would charge say \$2.00 per five lineal feet we would charge only about \$1.00 per 100 lineal feet. Then there are signs done on glass and by stencil, in which leafing is the principal material used, and for such work prices must be made to suit, being based upon amount of material and labor. No precise set of prices can be given in this connection.



For other glass signs or lettering with leaf see under different heads.

**GILDING ON GLASS.**—Work done on windows; if done on ground floors increase rate by 20%.

	<i>Per Lineal Foot</i>	
	<i>Gold</i>	<i>Silver</i>
5-inch letter, one shade or lined.....	\$1.60	\$1.20
6-inch letter, one shade or lined.....	1.80	1.34
8-inch letter, one shade or lined.....	2.00	1.50
10-inch letter, one shade or lined.....	2.60	1.74
Four-inch or less outlined, or with ground, per lineal foot,	\$2.00.	

For each additional shade add 20%. For ornamental face add 60%. For blended shade add 80%. For each additional upright inch to letters add 30%. For embossed work add 50%. For gilded outline lettering with transparent center add 50%. For colored background stippled and varnished add 10% per square foot extra. For gold or silver lines around panels, 3/8 inches wide, 20c per lineal foot. Up to 1/2 inch, per lineal foot, 40c.

A sketch should be made for each order, which helps in making a correct estimate, and also often results in securing the work. Draw to a scale of 1/4 inch to the foot.

**GLASS FASCIA PANELS, INTERIOR.**—Charge per square foot, \$6.00.

**GLASS SWING SIGNS, IN FANCY FRAMES.**—Charge \$6.00 per square foot, glass measure, up to \$10.00 per square foot.

**GLASS SWING HALL SIGNS, ONE SIDE.**—On frosted glass, lettered in black or colors, same as swing signs in color letter.

**LAUNDRY SIGNS.**—These are board signs placed on the sidewalk. They are mostly done with paint lettering, but sometimes gold or aluminum leaf is used. The prices given are for both sides. For single boards charge as for similar lettering on signs. For lots of ten or more use the following price list.

<i>Size</i>	<i>Paint</i>	<i>Gold</i>	<i>Aluminum</i>
12 by 18 inches, each.....	\$2.00	\$3.00	\$2.50
14 by 20 inches, each.....	2.50	3.50	3.00
16 by 24 inches, each.....	3.00	4.00	3.50
18 by 30 inches, each.....	3.50	5.00	4.00

<i>Size</i>	<i>Paint</i>	<i>Gold</i>	<i>Aluminum</i>
20 by 36 inches, each.....	4.00	6.50	5.00
24 by 36 inches, each.....	5.00	7.50	6.00
24 by 48 inches, each.....	6.00	9.50	7.00

OFFICE LETTERING.—The first set of figures refers to paint or aluminum, the next set referring to gold lettering. For doors and windows.

1-inch letters, each.....	\$ .10	\$ .24
2-inch letters, each.....	.14	.30
3-inch letters, each.....	.20	.40

#### JAPANNED TIN SIGNS.—

<i>Size</i>	<i>Gold</i>	<i>Paint</i>
Up to 3 by 14 inches, one line.....	\$1.60	\$1.00
Sizes from above 3x14 to 6x18, one line....	2.50	1.50
Sizes up to 10x14, two to three lines.....	3.00	1.60
Up to 12x17, two to three lines.....	3.20	2.00
Up to 14x20, two to four lines.....	4.50	3.00
Up to 18x24, two to four lines.....	6.00	4.00
Up to 20x28, two to four lines.....	7.50	5.50
Up to 24x30, two to four lines.....	9.00	6.50
Up to 24x36, two to four lines.....	11.00	8.00

The prices given include outlining and shading, and are for the tin and lettering. Such signs are mainly used by dentists and physicians. Some sign painters make the prices for lettering with paint and aluminum 25% of the prices given for gold. By this method the prices given for paint would be increased. The prices given here are for a single sign, and where ten or more are ordered at one time with the same reading, a discount of about 20% may be allowed. For lettering on aluminum leaf a discount of 20% may be given.

UNMOUNTED MUSLIN SIGNS.—For ordinary, per square yard, 90c. Fifty or more square yards, per square yard, 80c. For 100 or more square yards, per square yard, 70c. For mounted muslin signs add 10% per lineal foot to above prices. Muslin banners for railway cars, per square yard, 90c. Add \$3.00 a banner for sewing and rope.

Some charge 20c per square foot for muslin sign work, which would

double the above price list. But this is for one square yard sign only, decreasing the rate as the size increases, so that a sign of four square yards would be at the rate of 14c per square foot, and for an area of 300 square feet the charge would be 10c per square foot, or 90c per square yard. Others charge by the lineal foot, same as lettering on wood, grading the price by the height of the letters. Colored work is charged extra, say 40%. The same rate applies to pictorial work. For cut-in work add 4c per square foot additional. In all cases you furnish the muslin, but charge extra for frame, molding, etc., for frame adding 4c per square foot of sign. Banding and molding each 2c per square foot of sign.

**OIL CLOTH SIGNS.**—Ordinary, per square foot, 30c. For 40 or more square feet, 24c. For 75 or more square feet, 22c. Frames additional, 8c per square foot of sign. Cut-in work, 4c per square foot of sign additional. Banding, 2c per square foot of sign additional. Molding, 2c per square foot of sign additional. Fancy background, 25% extra. Painting before lettering, per square foot, 4c.

	<i>Paint</i>	<i>Gold</i>
5-inch letters, each.....	\$.22	\$.44
6-inch letters, each.....	.26	.50
7-inch letters, each.....	.30	.60
8-inch letters, each.....	.36	.70

Ordinary one-stroke letters in paint, each 10c. Shading or other fancy work add 20%. Office transoms, gold, numbers, each numeral up to 99, 50c. Each numeral after 99, gold, 40c. Numerals in any paint color, each 50% less than for gold. Silver or aluminum same as paint. Estimates are based on sizes up to five inches.

**REAL ESTATE SIGN BOARDS.**—These may be either hand-painted or stenciled, and the price must be set accordingly. Also the charge will be much more for one or a few than for quantities. Some charge \$2.00 for a 2 by 3 foot board, lots of less than 25. In 100 lots they charge \$1.80 each. For all sizes larger than 2 by 3 the charge is by the square foot, 2c, with a reduction of 2c per square foot for lots of 25. Stenciled signs may be done for about one-fourth the price of hand-painted signs; they may be sold at that rate.

Prices vary with different cities, and even in different shops in a city.



Where some charge 2c per square foot for a certain size sign others may be found to charge twice as much. However, in cities competition is keen and that keeps prices down and lessens wide differences of prices, too.

Real estate signs painted white and cut in with black may be done cheaper than black letters on a white ground. Where more than one color is used an extra charge is made. The area of a sign board affects price. Thus, a board containing say ten square feet will cost a third more per square foot than one having an area of 100 square feet.

10 by 12 inches, in lots of 25 or more, each.....	\$1.00
in lots of less than 25, each.....	1.20
for a single one.....	1.80
12 by 18 inches, in lots of 25 or more, each.....	1.50
in lots of less than 25, each.....	1.70
for a single one.....	2.00
12 by 24 inches, in lots of 25 or more, each.....	2.00
in lots of less than 25, each.....	2.30
for a single one.....	3.00
24 by 36 inches, in lots of 25 or more, each.....	4.00
in lots of less than 25, each.....	4.50
for a single one.....	5.00
36 by 48 inches, in lots of 25 or more, each.....	6.00
in lots of less than 25, each.....	6.50
for a single one.....	7.50

The above includes the boards and two coats of the best white lead paint; it is for best work. Discount may be made to suit circumstances—a statement always well to make when speaking of prices. Rather than lose a desirable job or customer one may well cut his prices.

SWING SIGNS, PLAIN, TIN OR ZINC.—To be done both sides.

	<i>Gold</i>	<i>Paint</i>
6 by 12 inches.....	\$4.00	\$3.00
10 by 14 inches.....	6.00	4.00
12 by 18 inches.....	6.50	4.50
14 by 20 inches.....	7.00	5.50
18 by 24 inches.....	9.00	6.00
24 by 30 inches.....	14.00	10.00
24 by 36 inches.....	17.00	11.55

For japanned tin add 20 per cent. If on board, add 15 per cent. If fancy shape, add 40 per cent. If on one side only deduct one-third.

SILK OR SATIN LETTERING.—Gold, per lineal foot, \$2.00. Silver, per lineal foot, \$1.50. Color or bronze, per lineal foot, \$1.00.

TIN STAIR STRIPS.—Done in gold or silver, per lineal foot, \$1.00. Done in two colors, per lineal foot, 60c.

TRANSOMS, HOUSE NUMBERS ON.—Up to 8 inches high, with paint, \$3.00. If done in the shop, \$2.00. Three to five numbers, one trip, paint, \$1.50. Five or more numbers, one trip, \$1.20.

Done in gold or silver, add \$2.00 more to each item in above list.

WALL SIGNS.—Wall signs may be on brick or wooden surfaces, but prices are same in both cases. If brick wall must be first-coated, add per square foot from two to six cents, according to condition of wall and quality of paint used. For stacks and other high and difficult places add 4c per square foot. For ornamental backgrounds add 30% to 50%, according to kind and amount of work. The estimates are based on square feet of surface painted and lettered. Prices range from 20c per square foot up to 100 square feet, to 10c per square foot for 500 square feet or more. This is for ordinary plain lettering; more or less fancy lettering, with colors, add from 2c to 4c per square foot. For extra coat of paint add 2c per square foot.

WAGON LETTERING.—

	<i>Aluminum</i>	<i>Gold</i>	<i>Paint</i>
Plain, one color, per lineal foot..	\$0.50	\$0.80	\$0.40
Same, with one shading.....	.70	1.00	.60
Same, with ornamental work...	.90	1.20	.80

The above prices are for letters up to five inches. For every inch above five add 4c. Pictorial or other fancy or ornamental work may be charged for at the rate of \$2.00 an hour.

WOVEN WIRE SIGNS.—

The charge for the wire mesh sign ready for the letters is about, per square foot.....	\$0.50
Add for painting mesh, if required, per square foot....	.16
Charge for erection of sign, per square foot.....	.70
Galvanized iron letters and attaching same, per vertical inch .....	.20

Gilding galvanized iron letters, per vertical inch.....	.30
Wooden letters and attaching same, per vertical inch.	.16
Gilding wooden letters, vertical inch.....	.20
Aluminum leafing .....	.16

#### WINDOW SHADE LETTERING.—

Gold, per lineal foot.....	\$1.00
Silver, per lineal foot.....	.80
Paint, per lineal foot.....	.70
Add 10 per cent. for shading.	

To measure gold leaf on raised wooden letters, get the number of square inches on an average letter of the size required. Standard gold leaf is  $3\frac{3}{8}$  inches square. Estimate it at 3 inches. That will give each leaf nine square inches of covering quality. It will allow for laps and other losses, including some damaged leaves in the pack. The time and other matters you can figure out in the usual way.

When estimating on a copper dome that is to be gilded allow each square foot of surface one and one-half books of leaf. Estimate the cost by counting the time, two coats of paint, one coat of oil size, and the gold leaf. Also cost of preparing the dome for gilding by washing off, etc.

#### MISCELLANEOUS INFORMATION

LETTERING CLOCK DIAL  
WOODEN LETTERS ON MARBLE  
LACQUER FOR GOLD LEAF OR IMITATION  
SUGAR OF LEAD IN SIGN PAINTING  
LETTERING ON WATER COLOR  
REMOVING VARNISH RUN  
LETTERING IN BLACK ON LAMP GLOBE  
LETTERING A BOX ELECTRIC SIGN  
ATTACHING WOOD LETTERS TO CEMENT  
GILDING COPPER DOME  
TARNISHING OF BRONZE LETTERS  
TO STRAIGHTEN OUT BRUSH  
LETTERING ON MARBLE  
REMOVAL OF PAINT FROM GLASS SIGN  
MIXING AIR BRUSH COLOR  
QUICK DRIER FOR STRIPING  
IMITATION GOLD COLOR  
PENCIL FOR MARKING GLASS, ETC.  
LETTERING ON OPAL SURFACE  
TO DO CLEAN LETTERING

TO PREVENT BLEEDING RED  
GOLD LETTERS ON ROUGH BOARD  
FLAT BLUE GROUND  
EXIT SIGNS  
PAINTING BARBER POLE  
GOLD LEAFING MONOGRAM ON VARNISHED SURFACE  
TO GILD IRON LETTERS  
ENAMEL PAINT ON SHEET IRON  
PAINTING AND GILDING WIRE SCREEN  
LETTERING ON GLASS FOR ELECTRIC LIGHT SIGN  
LETTERING ON WATER PAINTS  
VISIBILITY OF COLORS AT DISTANCE  
BEVEL FACED GOLD LETTERS ON WINDOW  
FANCY GOLD ON GLASS SIGN  
FROSTED SILVER SIGN  
CHEAP GLASS SIGN  
CHEAP RAISED LETTER SIGN  
IMITATION PEARL SIGN  
SPATTER WORK SIGN



- NOVEL SANDED SIGN  
HANDSOME SIGN  
SIGN READING THREE WAYS  
NOVEL GLASS SIGN  
FANCY MIRROR SIGN  
CHEAP ADVERTISING SIGNS  
BAS RELIEF SIGNS  
SUGGESTION FOR FINE SIGN  
WINDOW SIGN  
NOVEL STUCCO SIGN  
IMITATION EMBOSSED SILVER SIGN  
CHEAP PRINTED SIGNS  
FINE IMITATION EMBOSSED SIGN  
MATT CENTER LETTERING  
SIGN ON IMITATION STAINED GLASS  
QUICK GOLD SIGN ON GLASS  
GLASS SIGNS BY TRANSFER PROCESS  
PEARL AND GOLD SIGN  
CLEAR LETTERS ON FROSTED GLASS  
LAY-OUT ORNAMENTAL SIGN ON GLASS  
THE CUT-IN LETTER  
HOW TO HANG SIGNS  
COLORING ELECTRIC LIGHT BULBS  
LETTERING ON SHADE CLOTH  
GILDING LETTERS ON WINDOW SHADES  
LETTERING ON POLISHED GRANITE  
FASTEN CARVED WOOD LETTERS TO METAL OR STONE SILL  
CORRECTING ERROR ON FINISHED SIGN  
MAKING BOTH SIDES OF DESIGN THE SAME  
DANGER FROM PAINT ON PLATE GLASS SIGN  
HOW TO CLEAN PLATE GLASS  
TO CLEAN AND BRIGHTEN WINDOW GLASS  
TO REMOVE PAINT AND SHELLAC FROM MARBLE  
PREVENT BRUSH MARKS ON BACK OF GLASS  
PAINTING OLD WINDOW SHADES  
SIZE FOR DECALCOMANIA LETTERS  
PAINTING PICTURE ON DRUM HEAD  
PAINTING THEATRICAL DISPLAY SIGNS  
REMOVING FROST FROM WINDOW  
GOOD BLACK FOR CUTTING-IN WORK  
BRUSH MARKS ON TRANSPARENT COLOR  
WHITE LETTERS TO SHOW THROUGH GLASS  
POLISHING POWDER FOR GLASS  
SWEATING OF GLASS INJURING GOLD LEAF  
STRONG STENCIL PAPER  
ALUMINUM BRONZE LETTERING  
RESTORING COLOR OF GOLD LETTERS  
PANEL WORK ON GLASS  
LETTERING ON CELLULOID  
BLENDED GOLD AND SILVER LETTER  
QUICK WORK ON CHEAP SIGNS  
HOW TO GREEN COPPER  
NOVEL WAY TO MAKE GOLD SIGN ON GLASS  
BULLETIN SIGN PAINTING  
STENCILLING LETTERS ON SIGN  
QUICK GLASS SIGN WORK  
MARBLE BACKGROUND ON GLASS OR WOOD  
TO ATTACH ALUMINUM-BACK LETTERS ON GLASS  
TO MIX DRY LAMPBLACK WITH WATER COLOR  
LETTERING ON WINDOW WITH BRONZE  
PAINTING BOX TRANSPARENCY  
RAISED GOLD LETTER BOARD SIGN  
MODERN WAY OF GILDING ON GLASS  
VARNISHED GROUND BOARD SIGN  
MAKING FINE BULLETIN SIGN  
GILDING ON PAPER AND CALF-SKIN VELLUM  
GOLD LETTER SIGN IN 24 HOURS  
SIZE FOR ALUMINUM LEAF  
LETTERING WHITE ON DARK GROUND  
WATER GILDING ON GLASS  
BLACK SIZE FOR GOLD LETTERS  
GOLD LETTERS WITH SILVER BACKING  
WHITE LETTERS ON BACK OF GLASS  
POUNCING ON GLASS  
PREVENT SWEATING OF GLASS WHILE GILDING  
NOVEL QUICK GOLD SIGN  
LETTERING ON WIRE GAUZE  
TIN FOIL SIGN  
ANOTHER NOVEL SIGN  
ARRANGING CURVED LINES OF LETTERS  
LAYING OUT STAR  
MAKING LARGE CIRCLE  
TO MAKE HORIZONTAL LINE  
MAKING AN ELLIPSE

LETTERING A CLOCK DIAL.—If the part that is to receive the paint is first made slightly rough, as by embossing, for instance, the paint will adhere better. The paint should be thin, and yet heavy enough to give an opaque letter. As heavy paint expands and contracts a good deal

I II III IIII IV V VI

VII VIII IX X XI

1234567890

123456789

123456789

on glass it is likely to peel; hence the thin paint is safer. For ordinary lettering on glass use oil color, with a drop of varnish and a trifle of driers; but for the dial we advise using japan drop black thinned with a mixture of japan gold size three parts, turpentine one part, and boiled oil one-fourth part; the latter will slow up the color and cause the paint to adhere better.

To gild a tower clock face, first lay aluminum leaf, size this with oil size, and then lay the gold leaf. One leafing done this way will wear better than two leafings on the bare face.

To letter a clock dial, first sketch in the letters or numerals, as the case may be, whether Arabic or Roman, then outline them with the ruling pen, after which fill them in with a small camel hair pencil. Use gloss black paint, thinned so that it will flow easily from the ruling pen. A ruling pen gives true, sharp edges, difficult to make with the hair pencil. The Roman numbers should be proportioned as follows: The breadth of an I and a space should equal one-half the breadth of an X; that is, if the X is one-half inch broad the I will be  $\frac{3}{16}$  inch broad, and the space between the numerals  $\frac{1}{16}$  inch, this making the I plus one space equal to one-quarter inch or half the breadth of an X. The V should be the same breadth as the X.

WOODEN LETTERS ON MARBLE.—The letters should be coated with two coats of shellac, and when dry attach to the marble with a paste made of white lead in oil mixed with drying varnish; spread thinly and press down firmly, leaving very little cement under the letters. If the letters tend to slide down, glue a slight lath under the letters. This may be removed later.

LACQUER FOR GOLD OR IMITATION GOLD LEAF.—Take 8 parts of gum mastic, 4 parts gum sandarach, 4 parts kauri gum, and 4 parts gum camphor; dissolve in equal weight of 95 p. c. alcohol. If this does not give as free-flowing a lacquer as desired use about 50 parts of alcohol to 20 parts of gums.

SUGAR OF LEAD IN SIGN PAINTING.—Sugar of lead comes in tubes for artists' use, and is mixed with damar or mastic varnish. It gives a matt effect, useful when a matt center is desired, the outline or border being bright gilding; the matt center is stippled. With letters up to four inches high it is best to gild and outline the letters. When the backing is dry, clean off surplus gold and fill up the letters with sugar of lead from the tube; gild again, over the sugar of lead varnish, or let it dry. Use water size for gilding the filling of the letters. On letters of larger size first letter with the sugar of lead varnish, a little smaller every way than you intend to finish. When this is dry, gild on water size over the entire letter, and in backing up run around the letters so as to show a margin of burnished gold, all around the matt center.

LETTERING ON WATER COLOR.—Never use oil colors, though japan



color thinned with turpentine or benzine will do when a permanent color is desired. Color mixed with water and gum arabic or glue is the best paint to use.

**TO REMOVE A VARNISH RUN.**—Wet a piece of cloth and rub it over soap, dip in fine pumice powder, and rub the part that is to be removed. The soap will prevent the particles of pumice stone from sticking in the soft varnish.

**LETTERING IN BLACK ON LAMP GLOBES.**—Black made from asphaltum varnish mixed with japan black and turpentine scaled or blistered in a short time. Try lampblack mixed in coach or spar varnish, with a little gold size japan; mix as stiff as you can conveniently use with the lettering pencil. Exterior spar varnish, thinned with a very little turpentine, is best.

**LETTERING BOX ELECTRIC SIGN.**—A painter says that he has had difficulty in getting the paint to stay on the glass for more than six to eight months; it peels or cracks. The paint is on the interior, and there is no sweating. Varnish color appears to stand better than oil colors; for white use white enamel paint. Use turpentine sparingly as a thinning medium, as it weakens the varnish binder.

**ATTACHING WOODEN LETTERS TO CEMENT SURFACE.**—If the letters are small they may be made fast with a mixture of lead in oil with gold size or varnish, making a stiff paste and applying it to the edges of the letters, excepting the bottom edges. Press the letters close to the cemented surface. One difficulty is in keeping the letters clean, as the putty will squeeze up the sides. If the letters are large it will be necessary to drill holes and plug them with wood. To arrange for this it will first be necessary to fasten the letters temporarily with brads, fastening at the top of the letter, where the holes will not show. A brass or other metal plate may be made fast to backs of letters, and this plate may then be secured to the surface of the cement with screws, in the wooden plugs. The letters are fixed to iron bars or rods 1 inch by 3/16 inch by means of screws from the back. These are in turn secured to the wall with screws into plugs, or suspended from hold-fasts driven into the wall. By this latter method the letters may be secured close to the wall, or away therefrom. Paint iron rods same color as cement, to make them appear less noticeable.

Raised wooden letters may be secured from the back, using small screws and washers where the wires intersect, or you can use small

staples. To lay out the lettering fasten temporarily at the bottom, to form the base line, a strip of wood, say one inch, and place the letters on this until you have fastened all to the wires, when the strip may be removed. Galvanized letters may be soldered with galvanized iron strips to the backs of the letters, which cross the wires or strips, and small bolts may be used.

**GILDING A COPPER DOME.**—Clean off all dirt, then apply a wash made up of copper sulphate dissolved in water, to which add a little nitric acid, enough to make the water sour. This will cut the surface and afford a tooth for the paint. Apply two coats of paint, the first coat being made quite sharp with turpentine, and the next coat made of white lead in oil, colored with yellow ochre and thinned with boiled oil. To the first coat add a little varnish to bind the paint. Upon this foundation apply the gold size. Use a size that will dry with a tack in 24 hours but that will hold its tack a week. Use patent leaf, and take a still day for it, if possible. Try the size for tack before laying the leaf; if too tacky it will injure the luster; if too dry it will not hold well. Have the two coats of paint perfectly hard-dry before applying the size. The leaf used should be pure gold, and a heavy grade. If properly done a gilded copper dome will last well for about ten years.

The fat-oil size used should be thinned well with turpentine, and be applied quite thin, or rubbed out thin, more properly.

Some prepare the copper by simply washing it off with sal soda water, rinsing with clear water. Some advise a paint of yellow ochre and varnish, thinned with turpentine to dry flat and hard. Some advise a 48-hour size.

**TARNISHING OF BRONZE LETTERS.**—When you letter with bronze powder prevent tarnishing by a coat of thin shellac, followed by a coat of copal varnish.

**TO STRAIGHTEN OUT BRUSHES.**—When the bristles of a brush have warped or curled from setting too long in a can, wash out thoroughly in warm water and soap or washing powder, and while wet dip the bristles in dry wood ashes and chisel out the brush with the fingers—that is, shape the bristles about as they should be, then put the brush away to dry. This will make the brush like new.

**LETTERING ON MARBLE.**—Lay out the letters and size with gelatine

water size, to prevent the color spreading. Then mix whiting and gelatine size to a paint form and apply several coats, rubbing each coat smooth when dry. Next apply evenly a coat of gold size, and when of the right tack apply the gold leaf, and burnish with an agate burnisher. Several leafings will give the best job. Paint may be used if desired.

You can use a stencil pattern for putting on the letters, pouncing in with charcoal dust or dry ochre.

TO REMOVE PAINT FROM GLASS COLOR SIGN.—A safety razor blade makes a good tool for the purpose. Hold the blade at an angle of about 45 degrees, making downward strokes; this is better than using ammonia.

MIXING AIR BRUSH COLOR.—Thin out the oil color with benzine or gasoline; turpentine is too gummy.

QUICK DRIER FOR STRIPING.—To do a job of striping, use this formula: One part good rubbing varnish, two parts English finishing varnish, and one part turpentine; place these in a bottle, cork tight, shake well, and set aside for a few days. For striping with carmine, verdigris or Vandyke brown add a little good japan.

IMITATION GOLD COLOR.—A clever imitation of gold may be obtained with flake white ground in varnish and tinged with vermilion. French yellow ochre, burnt sienna, raw umber and white, all in certain proportions, can be mixed to imitate gold that is in half-shadow; so that a gold leaf pattern will not show upon it in some lights.

PENCIL FOR MARKING GLASS, PORCELAIN, ETC.—Take about equal parts of talc and beeswax and add any desired color or white, and knead together, then roll out in pencil form. Good for writing on glass, porcelain, metal, etc.

LETTERING ON OPAL SURFACE.—For lettering on opal or milk glass, mostly used by physicians and dentists, and on which surface the letters are so apt to peel off, try the best lampblack with a little white lead to give it body, thin with good medium drying body varnish, and very little turpentine. This will give a more tenacious color than is usually employed, though it is difficult to make a perfectly sure job.

TO DO CLEAN LETTERING.—If the sign has several lines of lettering, begin painting in at the bottom, and there will be no danger of your rest or mahl stick dabbing into the fresh color of the letters.

TO PREVENT BLEEDING RED.—If there are red letters on the old



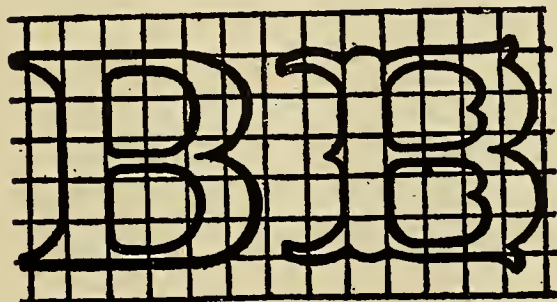
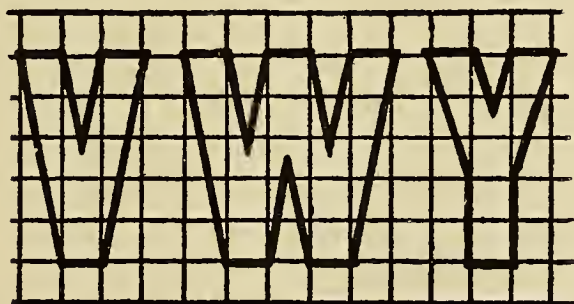
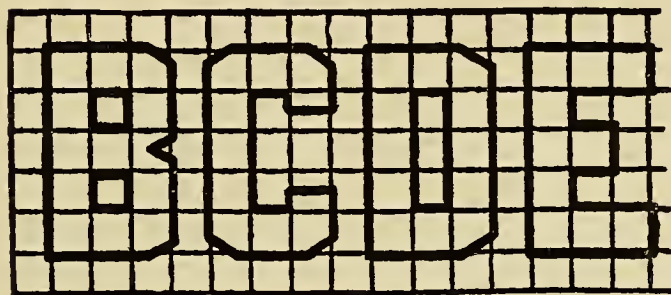
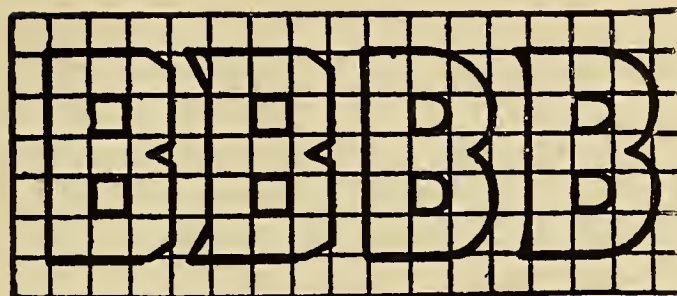
sign that is to be re-lettered, shellac them, though this is not infallible; better remove the red. Of course only aniline reds will bleed through, and some are better than others.

**GOLD LETTERS ON ROUGH BOARD.**—Usually such a board is covered with canvas or light duck, but some do it this way: Prime the board with good white lead paint (after having smoothed off any particular roughness), thinning the lead with equal parts of oil and turpentine; when dry, putty up and apply a coating of whiting-and-glue size; when dry, make smooth with fine sandpaper, dust off, and apply a coat of good interior varnish. When this is dry rub out with fine sandpaper and whiting; dust off, and the ground will be fit for the gilding.

**FLAT BLUE GROUND.**—The old way was to mix ultramarine blue with gold size, making a stiff paste, then thin out with turpentine, adding a few drops of raw oil. Then another way came into vogue—mixing the blue stiff with boiled oil and thinning out with turpentine. Then came a new method: Mix stiff with boiled oil and thin out with kerosene oil. The latest method consists in mixing the blue thick with varnish and thinning out with kerosene. This will dry hard, and the color will work freely under the brush, and not sink in. So declares an expert and he adds that it makes a good ground for aluminum letters. I would object to the coal oil (kerosene), one of the worst thinners used.

**EXIT SIGNS.**—If they are black ground with red letters, cut in the letters on the clear glass with black in varnish, and be sure to get an opaque black ground; mix the red in varnish and apply it with a flat brush, flowing it evenly over the back of the sign. The black ground must be perfectly dry before putting in the red letters. As soon as the red letters are done lay the glass with letter side up, so that the varnish color can flow out and hide any brush marks.

**PAINTING BARBER'S POLE.**—Once in a while the sign painter has a barber pole or other like advertising sign to do, and as his experience with such work is oftener small than great, a few words here concerning the work may find due appreciation. In the first place, the barber's outfit of pole and other sign devices, such as index hands, bath and other small signs, for use inside and outside the shop, are made by the factory, in many elegant designs, so that it is simply a question of price and selection with the hair artist. The poles range in size, counting at the base, from 6 to 12 inches, and they may be square, round or any other form. As to color, red, white and blue are of course the standard, but of late years



other colors are in favor, even black, while some have marble bases; some show white stars on a blue ground; these are usually at the top of the pole, under the gilded ball. If the sign painter has anything to do with the pole it is to renovate its colors. Where the stripes run up and down the pole, whether a round or square pole, the problem is to get the stripes true. When there is enough color left to guide the painter there is no difficulty, but not so otherwise. The edges of the stripes must be cut in very neatly. If the pole or post is square, then the best way to do is to lay out the stripes with a thin piece of board, the width of the stripe, holding it on the work at an angle of 45 degrees; with a lead pencil mark along the edges of the stripe and see that the corners meet each other on the adjoining side. Take the lines across chamfers horizontally. Say that the pole was painted solid white, then cut in with red, or with both blue and red, if these colors are desired. In this way you will have no wet edges to paint against. For a round pole, painted white, take strips of manila paper of proper weight and of the width you wish the stripes to be, and wrap them regularly around the pole, beginning at the top and fastening at the bottom, with tacks. If both red and blue stripes are desired, then run two strips of paper, which will leave white stripes between each color. Care must be taken to equalize the space, so that the colors will alternate evenly; it is seldom that more than red and white are run on a pole. The strip of paper prevents the paint from getting on the white, it makes neat edges, if tightly wrapped, and quickens the work. Some run a pencil along the edges of the paper, then remove the paper and paint in the stripes with a sash tool; when the paper is left on the stripes may be run with an 8-0 paint brush. To varnish the work use the best pale spar varnish; it will stain the white a trifle, but none to hurt. The colors under varnish must of course be such as will not fail, hence must be mixed with very little oil, thinning with turpentine and a little varnish.

**GOLD-LEAFING MONOGRAM ON VARNISHED SURFACE.**—Say it is a monogram on the panel of a coach. To prevent the leaf from adhering to the varnished surface cut a raw potato in two and rub the cut part over the part that is to be gilded and for a little space beyond; this will cause a slight deposit of starch, but after it is dry it will be best to repeat the operation. Then size in the monogram with fat oil and gild when the size is right. A thin, quick size of fat oil is best. When the gilding is dry the panel may be washed off with clear water.



**TO GILD IRON LETTERS.**—Give them a bath of acid water, muriatic acid, then rinse in clear water, and finally in a bath of milk of lime. Let the letters dry, dust off the lime, then apply a coat of iron paint mixed with boiled oil. When dry, sandpaper smooth, dust off, size with fat oil, then gild; two leafings will be best.

**ENAMEL PAINT ON SHEET IRON.**—Sheet iron or steel is liable to rust, and this even under paint. To prevent this as much as possible rub the iron, after cleaning it off well, with raw linseed oil, rub it into the metal, and leave none on the surface. The primer may be composed of equal parts of red and white lead. The next coat may be composed of white lead thinned with equal parts of oil and turpentine. The second coat, white lead thinned with  $\frac{2}{3}$  turpentine and  $\frac{1}{3}$  oil. The third coat,  $\frac{2}{3}$  zinc white and  $\frac{1}{3}$  white lead, thinned with turpentine, with a very little varnish for a binder. With smoothing, the surface will then be ready for the enamel paint, white or color.

**PAINTING AND GILDING WIRE SCREEN.**—There are different ways in use for this work, but raised wooden letters look the best. In fact, screen painting by hand is little done now. If you have to paint on dark wire place a dark cloth behind it; if on a light screen, place a light cloth behind it. Use a light color size on a dark screen, and a dark color size on a light screen. Use slow or quick size, as you may prefer. If the screen consists of two thicknesses of wire, and gold lettering is to be done, do the lettering on the front wire before it is put on the frame over the other wire. A number of handsome sign letters are now made for wire screens, and they produce a very rich effect.

The best way to paint wire screen is to lay it down on a clean, flat-top table, and pounce on the color with a large square-end stencil brush, or any brush answering the description, pounding the paint on, for if the paint were applied in the usual way, with strokes of the brush, it would fill the meshes, which must be avoided. The paint should be thin, mixed with boiled oil, turpentine, and perhaps a little japan driers. Apply two coats. Dry by suspending the wire. A paint thinned with turpentine and a little gold size is also good.

Any part of the painted screen that is to be gilded should be filled with white lead, using the dry lead, and thinning to a paste with turpentine and gold size. Some use a mixture of whiting and glue size. In any case the paint should be rather thick, being careful to get sharp edges to the letters. You can paste stiff paper on the back of the screen,

paint in your letters, and when dry the paper may be removed with warm water. If you wish to have the letters appear perfectly smooth, then apply several coats of the composition, or as many as may be required to give a smooth surface.

Lines, corners, and lettering should all be arranged as in ordinary sign lettering, etc. For corners it is best to use a stencil, which will allow of quick and clean work.

The raised effect of gold letters in relief is obtained by gesso treatment, usually with the aid of stencil plates cut from pasteboard. The compo is made with plaster of Paris and weak glue size. The face of the letters must be smoothed and sized as for gilding on wood. Another compo used is made from whiting  $\frac{2}{3}$ , and white lead in oil  $\frac{1}{3}$ , mixed with varnish and thinned out with turpentine. Another composition can be made from plaster of Paris made to a paste with a pint of water to which has been added  $1\frac{1}{2}$  oz. of pulverized alum. When dry, smooth and size with glue size. Follow with gold size.

**LETTERING ON GLASS FOR ELECTRIC LIGHT SIGNS.**—The paint is mixed from oil colors, thinned with good 24-hour rubbing varnish, adding a little japan drier and turpentine. When the work is finished apply a coat of light colored varnish, and on this apply a sheet or more of white tissue paper, and varnish that all over.

**TO COLOR ELECTRIC LIGHT BULBS.**—Clean off with soap and water and let dry. Then rub with clean, soft rag. Beat up whites of two eggs in one pint of clear water, and filter this. Dip the bulbs in this and hang up to dry. The best colors are opal, yellow, and ruby; blue, green and purple are not desirable, as they absorb too much of the light. A very satisfactory opal dipping is available, and in many cases this is preferable to frosting, not being so liable to collect dirt and get black. Aniline dye, dissolved in collodion, is used. Coloring mixtures may be bought ready for use. Yellow gives a frosted effect. Lamps permanently colored are the only ones that are strictly weather-proof, though some of the dyed ones wear exceedingly well. The best way to dip is to have the light turned on enough to warm the bulb, then take a cup of the dipping solution and raise it up slowly until the bulb is submerged therein up to its base; then slowly lower the cup, allowing excess of liquid to drain back into the cup. Let the lamp burn until the coloring is dry.

**LETTERING ON SHADE CLOTH.**—Size with gelatin, dissolved in ten

parts of water to four parts of the gelatin. To each gill of this size add fifteen drops of glycerine. The lettering color is made with tube color thinned with turpentine, making a flat effect. Two or three coats of color make the best job. Use a short and stiff lettering brush. To secure the best effect of dead color absorb the oil, that is, in the tube color, with blotter paper.

**GILDING LETTERS ON WINDOW SHADE.**—Mix a little burnt umber with some quick oil size; umber ground in oil. After the size has been applied and left to become tacky, say for a few hours, the gold leaf may be applied, in the usual manner. The addition of more or less boiled oil will regulate the time of drying of the size.

**LETTERING ON POLISHED GRANITE.**—To letter on polished granite, or any other polished stone, for that matter, ordinary oil paint will run, so that the paint must be a specially compounded one. Take dry, finely powdered drop black and mix to a paste with equal parts of sugar of lead, boiled oil, a little gold size, and a small amount of spar varnish. Thin out to right consistency with turpentine. Apply two or three coats of this paint, because the more body of paint there is the better will the paint wear.

To paint carved letters on marble or granite use the best asphaltum varnish.

**TO FASTEN CARVED WOOD LETTERS TO METAL OR STONE SILLS.**—Drill holes in the sill and drive wooden plugs into the holes. Attach thin brass plates to backs of letters, allowing the plate to extend a little beyond the letters, and along this flange or extended part drill holes for small screws, which are to go into the wooden plugs. Use brass screws only.

**CORRECTING ERROR ON FINISHED SIGN.**—It may be a misspelled word. On a smalted sign the sand must be removed, first laying down a T-square at the part that is to be corrected, this serving as a guide to the scraping. Then clean off the scraped place with rag and benzine, after which the part may be shellacked. Then make the required correction with paint, and re-smalt the part.

An error or blot on muslin sign may be painted out with japan white or distemper white, with as many coats as may be required to hide the part. Sometimes a muslin patch, sewed on, answers.

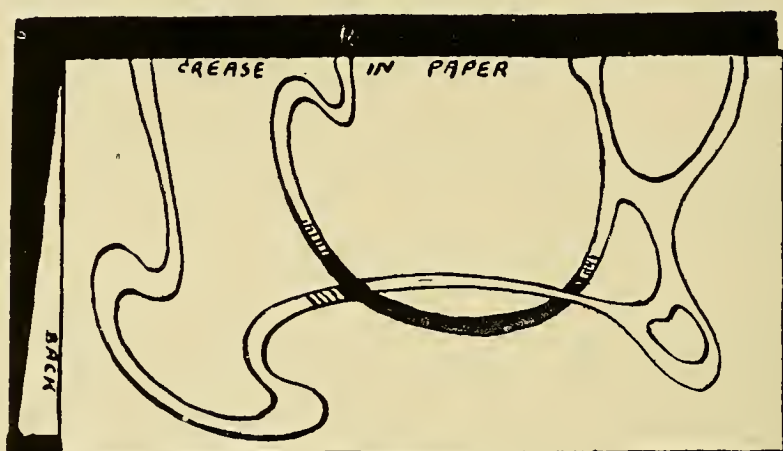
Errors on oil cloth or board sign may be wiped off while wet, using a rag wet with raw oil for oil cloth, and the same, with the addition



of benzine for the painted wooden sign. After which wash off with white soap and water, rinse with clear water, and wipe dry with soft cloth.

A mis-stroke with the lettering brush on a gold ground may be remedied by wetting a bit of cotton wool with water and deftly wiping off the color. It is easy to injure the gold this way, hence care must be taken to remove the paint with a single deft stroke.

**TO MAKE BOTH SIDES OF A DESIGN THE SAME.**—Draw the design on good manila paper that is large enough for one-half of the design. Draw this and then prick around the lines with a needle or thin awl, to make a pounce pattern. Pounce this on to the sign, pounce it in, then turn it over to the opposite side of the sign and again pounce in. This will make both halves exactly the same.



**DANGER FROM PAINTED SIGNS ON PLATE GLASS.**—Don't paint large, solid backgrounds on plate glass windows. The paint interferes with the contraction and expansion of the glass, which is liable to cause it to break. The danger from cracking seems to be greater where the window is exposed to the south.

**HOW TO CLEAN PLATE GLASS.**—Mix together one ounce of ammonia, one ounce of alcohol, and one ounce of whiting, and water to make one pint of polish. Rub this on the glass with a sponge and let it dry; then rub off and polish with soft cloth or soft chamois.

**TO CLEAN AND BRIGHTEN WINDOW GLASS.**—Dilute nitric acid until about like strong vinegar. Apply to glass and in a few moments throw on a little whiting; then rub with rag and polish with a dry rag. Rinse off with clean water, to which add a little alcohol, and

polish dry and clean. Repeat on opposite side. To make the glass shine take a half-pint bottle and place in it two tablespoonfuls of whiting, then fill the bottle with ammonia; shake well. Rub on window with soft cloth, let stand a few minutes, then polish with flannel.

TO REMOVE PAINT OR SHELLAC FROM MARBLE.—When marble is sized with shellac for lettering and it, or any other material used in the work, extends beyond the letters it may be removed by rubbing down with a piece of cuttle fish bone; it will not scratch the marble.

PREVENTING BRUSH MARKS ON BACK OF GLASS.—If the letters have a gold or dark-colored outline mix the white in equal parts of oil and turpentine, with very little drier. When the outline is quite dry and hard paint in the letters as smooth as possible; then with a pounce of cotton wool in a soft bit of old rag dab the white paint before it sets; dab lightly and evenly until all brush marks are obliterated.

PAINTING OLD WINDOW SHADES.—Tint white lead to required color and thin with  $\frac{1}{6}$  raw oil and  $\frac{5}{6}$  turpentine; make the paint thin. Apply with broad, flat brush and as quickly as possible.

SIZE FOR DECALCOMANIA LETTERS.—To make transfer varnish size thin, pale copal varnish or damar with benzine, and when it sets put on the letters or picture and smooth out. Remove the paper by dampening, wipe dry, then apply a thin coat of varnish.

PAINTING PICTURE ON DRUM HEAD.—Use varnish color. If transfer picture, size with varnish.

PAINTING THEATRICAL DISPLAY SIGNS.—They are exposed to the weather; and are used only about one week. Mix the color in  $\frac{1}{8}$  japan and  $\frac{7}{8}$  benzine. Little or no oil required.

REMOVING FROST FROM WINDOW.—The following is claimed to prevent formation of frost and sweating. Dissolve two ounces of glycerine in one quart of 62 per cent. grain alcohol. Add one drachm of oil of amber. Let this stand until it clears; rub the inside of the glass with it.

GOOD BLACK FOR CUTTING-IN WORK.—Many have trouble with the black showing gray streaks, on white ground with letters cut-in with black. Poor black. Use the very best lampblack, dry, and rub it up on the slab with boiled oil; if necessary to hurry the job, add a little gold size japan. Common lampblack is greatly improved by the addition of about 20 per cent. of Prussian blue.

BRUSH MARKS ON TRANSPARENT COLOR.—Stipple with a dry

brush, or with a pad of cotton wrapped in muslin. If the finish is opaque, give it color enough to shut out all light.

**WHITE LETTERS TO SHOW THROUGH GLASS.**—White letters trimmed with red border, painted on the inside of the show window, may be made beautifully white by using tube zinc white, and for large job enamel white will do. The Pillsbury flour people had some of these signs, and very beautiful, too.

**POLISHING POWDER FOR GLASS.**—Rub calcined magnesia down with pure benzine, to make a mass of consistency that will permit of making drops of the substance. Keep in a tightly stoppered vessel. When wanted for use, place some of it on a pad of cotton wool or other soft material and rub the glass with it.

**TO PREVENT SWEATING OF GLASS FROM INJURING GOLD LEAF LETTERING.**—Reference is had to the sweating of the glass after the job is done. The way that moisture injures the gold lettering is by getting under the edges of the letters, gradually forcing the leaf from the glass. After backing up the letters and allowing a trifle of the paint to extend beyond the edges of the letters, when you apply the varnish let it also go beyond the letters and the backing-up paint also. This ought to secure your letters against moisture. Use japan gold size for backing up gilding on glass. Use good hard-drying varnish.

**STRONG STENCIL PAPER.**—To strengthen the paper, for hard use, paste muslin on the back of it, and give both sides a coat of boiled oil. Shellac or quick-drying varnish is also good for saturating the stencil paper. Keep in a cool place.

**ALUMINUM BRONZE LETTERING.**—Give the ground a coat of flat white paint, to which has also been added a little quick varnish. As soon as the white paint is set rub on the aluminum powder with a pad, or with a piece of velvet or plush goods. Rub the powder well into the white ground. When dry it is ready for lettering on, with any desired color, and it will prove durable.

**RESTORING COLOR OF GOLD LETTERS.**—The gold becomes spotty and dark in time, and it may be restored in brightness and color by washing with a weak acid water, muriatic acid and soft water. Another wash is composed of carbonate of soda 20 ounces; chlorinated lime 1 ounce; table salt 1 ounce; and clean, soft water 1 pint. Mix and apply with a soft brush.

**PANEL WORK ON GLASS.**—The letter is a black edge lined, colored



center, and scroll work in gold leaf, with the background of the panel frosted white. Do the letters with japan colors, back scroll-work with gold size japan, panel background covering both letters and scroll-work put on with paint made from equal parts of boiled oil and spar varnish mixed with white lead.

**LETTERING ON CELLULOID.**—Celluloid signs are often used in lunch rooms, and are frequently washed. The lettering must therefore be done in durable color. Lampblack ground in japan and mixed with spar varnish is about the best paint for the purpose.

**A BLENDED GOLD AND SILVER LETTER.**—A very fine letter may be made by blending gold and silver, as follows: Gild one-third of letter deep gold, and when dry etch or scratch; blend with glass etching brush. Gild next section in lemon gold, etch, and finish with silver in the third section. Back up as usual.

**QUICK WAY TO DO CHEAP SIGNS.**—Next to the cut-in method the following is the fastest. When several copies of a sign are to be produced, for temporary use, it is not necessary that the edges of the letters be perfectly true, though with very little care they may be made reasonably true. Lay out the design or letters and make patterns of them, cutting them as perfectly as possible, and avoiding bevelling the edges, either in or out; and make the letters as near right as speed will allow. Now, instead of using a pencil for outlining the letters, take a sharp knife and go around the patterns, the same as a carpenter uses a knife and square. With a fine bristle or camel hair brush cut in the letters. The cut in the board that the knife made and which may be made as deep as desired, absorbs the excess paint that flows from the sides of the brush, and the edges of the cut prevent the paint from spreading, at least to quite a degree; or, rather, the cut serves as a guide for the brush, and enables you to handle it quicker without fear of making bad edges.

**HOW TO GREEN COPPER.**—Repeated applications of strong vinegar, or acetic acid alone will produce the verdigris incrustation, but it will require more time than the following: Dissolve four ounces of distilled verdigris and two ounces of sal ammoniac crystals in one quart of strong white-wine vinegar or acetic acid, and wash over the copper repeatedly, allowing each coat to dry before applying another. When the desired effect has been obtained rinse well in clear water, let it dry, then brush with a dry brush.

NOVEL METHOD OF MAKING GOLD SIGN ON GLASS.—Cut out the letters you wish for the inscription, with ornaments if any, from stout manila paper, and paste them on the inside of the window in their proper places, using a weak paste. Now shade the letters on one side and run a line on the other side, the same as if the gold leaf had been laid. The whole work is finished before leafing and backing-up. After the paint is dry remove the paper letters, wash off the paste, apply the size, lay the leaf, and then back-up.

To compare this method with the standard way, in the latter it is necessary to use a weak size, as the edges of the leaf must be trimmed and squared up after backing, which a strong size will not admit of, and which is often responsible for the leaf chipping off in a little time. In the new way the workman may use as strong a size as he fancies, as it is not necessary to trim the leaf. It doesn't matter if the gold leaf does extend on to the paint, as the paint is between the leaf and the glass, and it is only the gold that shows between the lines of paint that is observed from the outside.

It of course takes some time to prepare the paper letters, but if the operator does not take too much time at this he will no doubt save time over the old way; for, when the inscription is laid on the glass the painting can be done at once, and then you have only to wait for the paint to dry.

To the beginner or inexperienced workman the method offers an easier way than the old, and he can do better work with it, too.

LETTERING ON WATER PAINTS.—For work not exposed to the weather washable water paints make a good background for lettering, the flat, pure tints or colors enhancing the effect. The lettering can be done with the water paint, of a different color; or tube colors may be used, thinning with gold size japan and turpentine. Any color will do, if it does not contain much oil, which would cause it to spread over the surface and make a halo about the letters. The letters should not be glossy. Gilding may be done on the same surface, in the usual manner, though the gold size must be made thicker, say with a little melted resin. For large letters first fill them in with thin, white shellac, to stop suction. An advantage with such signs is, that the water paint can be quickly prepared, as it soon dries, applying two coats. Sand-paper with fine paper. Ordinary calcimine or glue-sized water paints will not do, as the paint sinks in and gives a patchy effect; such paint

would not resist the weather, if the sign were to be used outdoors.

**COLORS VISIBLE AT DISTANCE.**—For sign boards that are to be read at some distance there is nothing better than the white letter on black ground sign. So-called tests have been made, and scientists have given their conclusions, but without displacing the old-time white and black. The explanation of the black and white combination is, that black is a shade, hence is retiring; white is light, hence advancing; so that the white letters go forward to greet your vision.

**BEVEL FACED GOLD LETTERS ON WINDOW.**—For a good job in two shades of gold leaf, form your lay-out carefully and do accurate work with the pencil when backing-up the leaf. Draw the design on paper and prick it in, then pounce it on the outside of the glass, noting the exact position of the pattern, so that you can place it in the exact position again. Gild first with the light leaf, then set the pattern on the back of the glass exactly as it was on the front, pounce it, and back up the light part only. When it is hard-dry clean off the light-colored leaf not covered by the backing color; put on the deep color leaf and again set the pounce pattern on the back of the glass, exactly as at first. Pounce it and then back up the deep leaf. It is this way that the beveled effect is produced. Another way is thus: After the pouncing-in on the front of the glass run a fine line of light Naples yellow in quick varnish on the back of the glass, showing in skeleton the outlines of the letters and the dividing lines between the deep and light leaf. When these lines are hard-dry gild the letters preferably the deep gold first, backing up with good varnish color, then do the light gold the same way.

**FANCY GOLD-ON-GLASS SIGN.**—This sign shows a gold outline and a transparent letter with a background. Gild and back-up the outline in the usual manner, clean up, then coat the whole space with background color; then pass a plush roller over it, to give the stippled effect. Wipe out the centers of the letters with cotton flannel moistened with water. Next, lay in the centers with any desired color, stippling it with a small pounce of rag.

**FROSTED SILVER SIGN.**—This requires a sheet of steel, properly painted. Lay out the lettering with chalk, leaving an outline and shade, and, before painting-in, lay on the background for smalting. The smalting may be done with coarse smalts, and it must be made clean of dust and dirt; better wash it. Take one part varnish and two



parts turpentine, mixing both together, and pour it over the entire surface of the smalts, and when it has become just right to take gold leaf, strew over it aluminum bronze, in the same manner you would put on smalts. When this has had ample time to become perfectly dry brush off the loose bronze, using a soft hair brush, and then paint in the letters, black or any desired color, adding plenty of varnish to the color. Don't let the lettering come nearer than a fourth of an inch to the sanded part, in this way getting a bright outline or outline and shade, as you prefer, to the lettering. The effect is that of a frosted silver sign, with very distinct lettering. The aluminum bronze stands better than the leaf.

**A CHEAP GLASS SIGN.**—Have a sheet of stencil or manila paper, and on it draw your design, the size it is to be on the glass. Make this design perfectly clear. Having mixed fine bronze powder with varnish, thinned to a working fluidity with turpentine, outline your design or lettering on the front of the glass, and when this has been done, and is dry, proceed to shade it. You may run an outline of black around the letters, and when this is dry go over it with a carmine shade, and finally apply vermilion, to lap over the other colors as far as you choose. Always running the darkest color first, other colors may be used in the same way. For a blended effect lay in the bronze as directed, leaving proper space for the shade. When this is dry apply your colors, with black for the background, for that shows up the colors best. Put in the lighter shades first, go over the inside openings of the letters with transparent colors, which come in tubes. You may use carmine, ultramarine, etc., mixing color with varnish, and then, before this is dry, apply tinfoil or other suitable leaf, crumple it and lay on the letters.

**CHEAP RAISED LETTER SIGN.**—Smalt a sign board and when it is dry lay it on two trestles. Then stretch two chalk lines along its length, these to serve as lines for laying on the letters. The lines must be made fast at the ends with tacks. The letters are to be wooden ones, gilded. They may be made fast to the board with brass brads.

**IMITATION PEARL SIGN.**—Outline the letters, and fill in remaining space with a pearl gray paint, made thin and transparent with Damar varnish. When the paint is dry crumple some tinfoil in your hand, cut it to the size of the letters, size letters with Damar, quite thin, or rather size the foil before cutting it. If outlines are in gold, the

centers may be filled with gold leaf over Damar size. This gives a matt effect. Or the crumpled tinfoil may be laid on the Damar size.

**SPATTER WORK SIGN.**—The board background may be painted white or any light tint, and when the paint is dry place paper letters, neatly cut out, or such as may be bought, on the board, making them fast with tacks or pins, and then spatter the work with some color darker than the ground. When the spatter is dry remove the paper letters, which will be useful again. Coarse spatter looks better than fine, hence the air brush or atomizer is not so well as the brush and stick method.

**NOVEL SANDED SIGN.**—Paint in the lettering on a suitable grounded board, and over it sift clean sea-sand. When dry apply gold size, letting it go a little beyond the letters; use a slow size. When of the right tack lay the gold leaf. Deep gold is best. In about two days you may cut in with a deep, glossy green paint; smalt this with green sand. The addition of a little red sand to the green makes a fine effect, but care must be taken that not too much is added, as the red sand is heavier than the green and unless kept well stirred is apt to settle to the bottom.

**A HANDSOME SIGN.**—Tinge white lead paint with a little ivory drop black, to make it a silver gray; paint a board with this. The letters may be painted in pure white; shade with gold leaf close up to the letters. With a glaze of Vandyke brown darken the bottoms of the gold shading, blending up into the gold until the glaze fades away into gold. Next, shade close to the gold shade with two natural shades of the ground color. If any ornamentation or embellishment is wanted let it be done with gold.

**SIGN THAT READS THREE WAYS.**—This was a great favorite years ago. A moulding is placed around the sign board, and saw-curfs or cuts are made into this moulding about an inch apart and extending down to the face of the sign board. Strips of sheet iron or stout tin are prepared, an inch wide and long enough to reach across the face of the sign board. Paint both sides of these strips the color of the sign board; it is advised to paint both the board and tins at the same time. Paint the board first, then as you paint the strips you can slip them into the cuts at once. When all is dry, remove the strips and letter the board. Then lay the strips edge to edge on a table and paint the lettering you wish on them, different of course from that on the board. Let the

strips dry, then turn them over and letter another inscription on them, let dry, then place in the grooves. As one stands in front of this sign he reads the lettering that is on the board; as he moves away to the left he reads the inscription that is on one side of the strips, or, moving in the opposite direction, he reads the third inscription.

**NOVEL GLASS SIGN.**—Draw the design or letters on paper, neatly cut out the letters, and paste them properly on the glass. Paint in around the letters, cutting in neatly around their edges, and when the paint is dry remove the paper with warm water; apply gold or aluminum leaf to the letter spaces, which have been sized with gold size; or colored mica or thin scales of mother of pearl may be scattered over the half-dry size. Back up with a coat of lacquer. Such signs do only on the inside of windows.

**FANCY MIRROR SIGNS.**—There are two styles of this sign, the mirror background and the painted background. For the former kind get a bevelled plate mirror the size you wish the sign to be, and paint the back of it with a quick drying paint, to protect the back of the mirror. Allow this coat to become hard, then proceed to sketch scrolls, letters, etc., on the back of the glass (a pricked pounce pattern is the best way); then scratch out the letters, removing the paint and backing from the glass so that the letters will show perfectly clear when held up to the light. Allow no specks to show in the design, for they would also show in the finished sign. The letters are to be backed up in any one of the following ways: if a gold letter is desired, instead of using ordinary gold leaf use fancy gold colored foil, which is cheap and looks even better than gold. Use fish glue size, and crumple the foil, the more the foil is wrinkled the richer the letter will appear in the sign. But if the foil is in streaks, checks or scrolls, as sometimes happens, it will be unnecessary to wrinkle it. It is a good plan to have a metal plate, if possible, with raised design or scroll, and instead of wrinkling the foil press it on to the metal design, a rubber roller being useful for the purpose. This will transfer the design to the foil, and make the scroll-old effect in the face of the letters.

If you wish to make colored letters, with gold or silver border, then, before laying the foil, paint the letters on the back of those already scratched on glass, leaving sufficient border to allow the gold or silver to show from the front. Other designs, such as the gold letter with black scroll center, gilt letter with black border, etc., are made by trac-



ing with a fine brush such lines as are necessary, before the foil is applied.

The black or colored background sign is made the same way, excepting that instead of using the mirror you use plain glass. The next thing is to back up the sign, and for this you will require a sheet of re-dipped tin, or some such metal, cut as much larger than the sign as will be required to come up over the edge of the glass and crimp about a fourth of an inch over front. Now place it in any kind of a frame desired, and the sign is done.

**CHEAP ADVERTISING SIGNS.**—They may be made in many different ways. One of the best is made as follows: Draw your design on paper and prick it out so that it may be pounced on the back of glass, but in such a way that it will show backwards. Attach it to the back of the glass with gummed strips, and proceed to outline it in fine gold striping bronze, mixed in a little varnish and thinned with turpentine. When this is dry shade the letters. A good effect may be obtained by running a black line shade, then when it is dry put in a carmine shade, then extend the shade to size wanted. Or you can lay green next to the black, and then a lighter shade of green, always having the darker color or shade next the letter. To make a blended shade lay in the background, which should be black or some very dark color, leaving a space for the shading; when dry, put in the shade colors, beginning with the lightest and working towards the letter. When dry, paint in the openings of letters with transparent tube colors, such as carmine, ultramarine blue, etc., mixing with varnish to increase the transparency. When this is nearly dry, crumple up some tinfoil in the hands, and lay it over the letters; this will finish the work.

**BAS RELIEF SIGN.**—For making bas relief signs use papier-mâché mixed with a small amount of plaster of Paris. As this material sets quickly the work must be done with haste. The too rapid setting may be retarded by adding to the compo a little arrowroot or vinegar.

**SUGGESTION FOR A FINE SIGN.**—Paint the ground ivory white. When dry, set out the lettering with a pencil. Now glaze the letters with a little cerulean blue in varnish, then stipple them, to get a good transparent and bright blue with a little grain in it. Treat the background similarly, but with a little terra verte. When these glazes are dry and hard, pounce the sign and write the outline in oil size and gild. For a nine-inch letter the outline may be one-quarter inch.

**A WINDOW SIGN.**—A very effective window sign is described as consisting of the main portion of the letters having tinfoil reinforced by scrolls of blended green and purple; the letters were block style, being laid on the inside of the glass, showing as described.

**NOVEL STUCCO SIGN.**—Either cut out letters from strawboard, or get the ready-made paper letters, if you can get them of sufficient thickness. Fasten the letters to the sign board with small tacks. First paint the board with two coats of paint. When dry, mix some plaster of Paris with strong glue size, quite thick, and spread it all over the sign, after having tacked on the letters. Use a stiff brush. Take a steel or other suitable comb and scratch the surface in any design you may fancy. When this is dry remove the letters and coat the whole sign with two coats of paint. Then gild the rough surface with gold and cut in the letters with black. Or you can lay aluminum leaf instead of gold, and cut in the letters with dark blue. In either case you will have a very attractive sign, one that is also very durable.

Another way is to put the rough surface on with a composition of white lead and fine pumicestone powder, mark out the design, and set in carved wooden letters before the compo is dry.

**IMITATION EMBOSSED SILVER SIGN.**—After finishing the letters, etc., with gold leaf, which may be shaded with some warm, dark colors, put in the ornamental design of the embossing with two shades of silver gray made of white lead tinted with ultramarine blue and black, making one shade a little lighter than the other. When this is dry coat the whole over with clear varnish, to which has been added a little gold size, and while the varnish is still fresh sprinkle over it as much aluminum bronze powder as it will take, and hold; this gives it the appearance of matt silver. To make the mock embossing on the glass under the letters, varnish the design on the glass before sizing on the gold leaf, and where the varnish is the glass will appear to have been embossed.

**CHEAP PRINTED SIGNS.**—When a large number of cheap advertising signs are wanted, of a more durable sort than those the printer gets out, such, for instance, as thin wooden signs, or cloth signs, they may be made in the manner here described. First, make a matrix of heavy strawboard, cutting out the inscription you wish on the sign, then fasten it to a smooth board or glass with paste or cement, making a frame around it of quarter-inch wood. Now make a composition of equal parts of glue, which has been dissolved or melted in as little water

as possible, and molasses, heat both together and stir until perfectly mixed. Next, grease the matrix and exposed parts of board or glass, so that the composition will not stick to it, and while still hot pour it onto the matrix to the top of the moulding. When it has become cold it may be lifted out in a solid sheet of rubber-like form. It may then be attached to a rocker, such as the half of a cheese box, or one may be made. The sheet containing the lettering may then be glued to the rocker. The latter must of course be large enough to take width and length of the printing strip. The next thing is the printing ink. Rubber stamp ink would do, but is too expensive. You can make an ink from lampblack ground in oil and mix it rather stout with oil, adding also a little varnish. You will then require a pad, which may be made from a board of suitable size, and on it fasten a layer of raw cotton, covering with muslin or light canvas. Saturate this pad with your ink.

Paint the boards that are to receive the printed impressions and make them smooth, in order to make nice work. Pass the rocker over the ink pad a few times, then transfer it to a board, rocking the printer back and forth on the board until the letters look well covered. Be very careful the printer does not slip and mar the letters.

The letters may be shaded with a light color first, then a darker color for the face. It should be observed that this shading is put on before you pass the printer over the board, or before the lettering is printed.

If you want to print on muslin get that which has been sized; this may be bought, or you can size common muslin with cooked starch size, afterwards ironing out all wrinkles.

If you wish to print the signs on paper, you will not need a rocker, but the matrix may be laid down flat and inked, then the paper may be laid on it and a board with weights may be placed on it and left there a moment or two.

The foregoing method may be reversed by cutting out letters and fastening them to the matrix board and pouring the composition on, which will give the letter spaces open, so that when you print with them all the sign board will be coated but the letters, which will show the ground color, which may be as you wish, or it can be a variegated coloring.

**FINE IMITATION EMBOSSED SIGN.**—The name of a business firm was done in large Roman letters, having a stout burnished outline of gold, with imitation embossed silver body. The outer edge of the gold



outline is edged with a fine line of black, the inner edge having a fine line of gray several shades darker than the silver. The silver effect of the body of the letters is made by sizing with varnish and dusting aluminum bronze over it. The gold and other two outlines or edges are first put in, then the body of the letters is coated with a thin, clear varnish, Damar being good, to which has been added a little gold size and turpentine; when quite tacky the bronze powder is put on.

**MATT CENTER LETTERING.**—The glass must be made perfectly clean, inside and outside, as for gilding. Lay out the inscription very carefully on the front of the glass, with chalk. Then with a mixture of a good quality of slow, light colored rubbing varnish, to which has been added a little zinc white, to slightly cloud the varnish, coat the space that is for the matt center. The varnish should be right for use with a camel hair lettering pencil, and if the varnish is too stout thin it with some turpentine. For letters eight inches or less in height it is well to put in the center first. On larger letters, say from 16 to 30 inches, or indeed any size about 8 or 10 inches, it is best to gild and outline the letters first. Then after backing the outline and cleaning off the surplus gold, put in the varnish center, and when this is dry gild on water size and so finish the work.

There are various ways for preparing the center for the matt effect. You may use varnish as already described, or mix equal parts of light rubbing and finishing varnish, with just enough lead acetate (sugar of lead) to give it a milky appearance. This will show you what you are doing. Damar or mastic varnish also may be used, adding some sugar of lead.

Another way is to take some whiting on a soft, wet sponge and apply a thin coating to the inside of the glass, and when it has dried apply the varnish to the inside of the letters, but leaving a margin between the varnished center and the chalk edges of the letters. When the varnish is perfectly dry wash off the whiting until the glass and letters are perfectly free from it.

The varnished center of the letter is gilded when the varnish has the right tack; some let the varnish stand until the following day, saying that this gives the best job, but much would depend upon the drying quality of the varnish size. At any rate, if it is a small sign or job, say 12 feet or less, it may be finished up the same day. All kinds of varnish centers are now put on according to the size of the job, time allowed for

the job, price for the work, etc. For quick, small jobs use Damar varnish tinged slightly with some dry zinc white.

In any case, when the varnish size is right lay the gold leaf, either from the book or from the cushion with a tip. Use pale or lemon shade.

A very attractive matt center may be made by using gold size and with water and a stiff brush spattering the wet size. When the size is dry gild with water size. The spatters will take a burnished gild.

For a rough or stippled center size with Damar varnish to which has been added one-tenth its bulk of balsam of fir, one-fifth its bulk of quick rubbing varnish, and a very little fine pumicestone powder. Apply this varnish and stipple it with a short-bristled brush. When it is hard-dry gild with water size and back up with japan chrome yellow. The gild may be pale leaf or ordinary, or it may be done with silver leaf. You may also vary the colors of the centers of the letters with thin glazes of rose madder, verdigris, emerald green, ultramarine blue or cobalt blue in the varnish before applying the leaf and allowing the glaze colors to dry before gilding.

The gilding done in this class of work is identical with the method given under the head of gilding on glass. Use a three-inch camel hair blender or brush for applying the water size, camel hair brushes and pencils only being used in glass gilding. Backing or heavy color would of course require heavier bristle brushes.

If the gilding should appear cloudy the size was either too weak or too strong, most likely the latter. The remedy is to let the work dry, when any cloudiness will appear, and flow on water that is as hot as can be used with safety to the glass. Do not go over the same place twice. When this has become dry repeat the operation if the gild is still cloudy or not entirely as bright as it should be. The hot water washed out the excess size. Some add a little gelatine to the hot water. When dry, back up.

The backing up is done as directed in glass gilding, and need not be repeated here.

After having varnished the matt spaces, you have left a margin around the letters or the varnish. You then proceed to form the letters, marked on the outside of the glass, edging the burnished outline with a thin edge of Prussian blue mixed with varnish; this blue appears as black from the front of the glass. After this is dry you may still enhance the beauty of the lettering with a red, light blue, or orange line on the

outside of the first dark blue line. After you have finished the outlining go back and varnish the back of each letter with spar varnish, going an eighth of an inch beyond the outer line to protect the whole. If you wish to edge the varnish center with red, blue, black or brown do it as soon as you get the varnish center on, before gilding. Use a mixture of same drying properties as the varnish center, for if slower or quicker it will crack where it over-laps.

When doing a gilding job on glass you will find it convenient to have a small alcohol stove for making water size, and have also a small vial of grain alcohol.

**SIGN ON IMITATION STAINED GLASS.**—A correspondent calls attention to a fine sign that he says gave a very beautiful effect. The lettering was done with gold leaf, which was nicely scrolled and shaded; it looked as though the sign had first been painted on the stained sheets. Whatever way this was attached to the glass it looked fine. The letters may have been put on the glass, it was difficult to tell. Perhaps some readers of this will know just how the work was done.

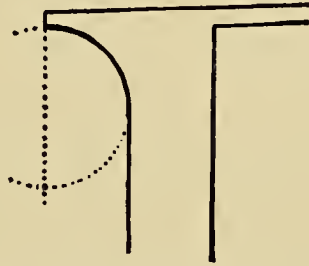
**QUICK GOLD SIGNS ON GLASS.**—A quick way to paint or gild several signs of the same kind on glass is to first lay out the sign as you want it, then cut out patterns of the letters of some suitable material. For gilded letters, place the patterns on the outside of the glass, using something that will not dry, to stick them fast, such as molasses. As is readily seen, the outlines of the letters may be easily followed either with paint or leaf. However, when painted, the better way is to mark around the patterns and paint them on the outside. Thus, the patterns may be used for any number of signs, and after the first is made the remainder may be made more rapidly than to outline each in an off-hand manner.

**GLASS SIGNS BY TRANSFER PROCESS.**—When a number of glass signs of the same reading are required the following process is useful. Take a piece of plate glass, highly polished, and with asphaltum varnish cut in the inscription on the glass, backwards. Or use the tinfoil method. In either way you leave the lettering bare. Acid is used in etching out these letters, cutting to a depth of about  $1/32$  of an inch. This done, clean the glass. The acid etching is described under the head of glass embossing, which see.

The transfer process follows. Make up a composition of dry ivory black or lampblack and tallow, beeswax, japan drier and asphaltum



gum. Melt the wax, tallow and asphaltum separately, and when reduced to a liquid condition add to them and mix together the black and japan, keeping the mixture hot in the meantime. In place of black any desired color may be used, but black is most commonly employed. When the composition is cold it should be about like soft putty; it is then ready for the work. Now with a large, broad-bladed knife, straight of edge and not sharp, also a hand brush about two inches wide and four inches long, with fine  $3/4$  inch bristles, trimmed even, so that when laid to the glass each and every bristle will touch the glass, you have the two important tools to work with. You will need also a bowl of water and some sheets of fine tissue paper, the size of the glass. Now you are ready to transfer. Place the etched plate glass on the table or bench, with the pot of color at your right hand. Take up some of the color on the knife and spread it over the etched glass, filling the let-



ARC OF CIRCLE FORMS THE SPUR

ters: then with the straight edge of the knife scrape away all color from outside the letters. Now lay a sheet of the tissue paper on the glass and with the hand brush press the paper against the black or colored filling. Having a sheet of the glass that you wish to transfer the impression to lying on your left-hand side, take hold of two end corners of the paper and lift it from the glass, and if the paste has been properly made the paper will lift it entirely from the matrix and appear as a neat printing on the face of the paper. Now lay the inked face of the paper down on the glass to your left and rub it with the hand brush, lifting the paper now and then to see how the work goes, and when you feel sure the work is done right wet the paper with a sponge wet with water from the bowl until the paper is saturated, when you may lift it and the paste will have attached itself to the glass, making the printed transfer. Set the glass away to dry for from 18 to 24 hours. In the latter space of time the composition will be hard enough to rub roughly.

In making up the transfer paste the relative amounts of the different ingredients must be governed by the temperature of weather or room. You will soon learn how to prepare it to suit any atmospheric condition.

This process is used for cutting in letters, designs, etc., for embossing with acid. Is also used for backing up gold or silver leaf, either a solid letter or an outline letter. It is used for lettering on glass with colors, such as red, green, brown, blue, black, etc., and with tinted or tinselled backgrounds. The process is much more rapid than its lengthy description leads one to suppose.

PEARL AND GOLD SIGN.—Pearl, as it comes in sheets, was once more commonly used in fancy sign work than now, especially for bank windows. It appears to good advantage when set off by brilliant colors, with black as a foil. Pearl comes in thin sheets, the trade names of which are, snail and aurora. The former is the finest, as it reflects either in a concave or convex position, according to the side that is presented to the eye.

In making a pearl leaf sign the parallel lines for the inscription are marked out with a pointed bit of hard white soap. If the pearl is to be outlined in gold follow the same course as for glass gilding. The space where gold is to show is indicated with black, on the reverse side of the glass. The varnish used for fixing the pearl leaf may be pure mastic, pale quick drying, Damar, or a mixture of copal varnish  $\frac{1}{3}$ , and Canada balsam  $\frac{2}{3}$ . Size with any one of these varnishes only as much space as will allow you to arrange the pearl leaf before the size sets too much; let the varnish extend a little beyond the letters. But first of all, the gilding is done, and when it has become dry set the pieces of pearl. The sheets are cut with scissors to fit a space, the edges being trued with a file, to make a perfect join. Or you may cut out a tin letter same as the one you are going to do on the sign, and on this fit the pieces of pearl, arranging the pieces as far as possible so that they will reflect the light in one direction, with the convex side up. Size each bit as you take it up, and place it on the opening in the letter in its proper position. Press it hard. If too much size has been applied the pressing down will cause it to squeeze out; hence it is better to apply the size as thin as possible, though not to the point of refusing to hold the leaf properly. Besides which, the less size there is the better the leaf will show. Of course you understand that the work is done from the reverse side of the glass; the varnish is applied with a stiff, short hair bristle brush.

In arranging the pieces try to secure a harmony of colors and uniformity of the pieces. This of course requires time, thought and care. Any openings left unfilled may then be covered with small bits, and then dust over all the finest parts of the pearl. As there will likely be some still uncovered part the back of all may be coated with aluminum bronze paint; or if the size is still wet enough dust on dry aluminum bronze. The backing up paint for the letters is made rather heavy, a pearl-gray paint, thinned with turpentine, with a very little oil and japan. The sides of the letters may then be shaded, if desired this way, and scrolls and ornaments also may be used.

When setting the pearl it is well to reverse the glass from time to time, to see how the work progresses, how it looks, and if necessary changes in the arrangement of the pieces may be made. Most deep, bright colors go with pearl leaf on borders or letters in the shading, much depending, where several are employed, on the order in which they follow each other. As greens with darker greens, reds with browns, purple yellow with brown purple, etc., these being carefully blended. White also looks well.

**CLEAR LETTERS ON FROSTED GLASS.**—Rub the glass with whiting and water, let it dry, and set out the inscription by marking horizontal lines and letters with a pointed stick; then outline the letters in black, brown or gold; when dry and hard the frosting may be done, and while still wet wipe off the inside of outline; this makes a sharp, clean-cut and readable sign. Another way is to use paper letters, slightly gummed on one side, wet them, then place on glass as they are to appear. A good way is first to place the letters on paper, as a guide. When all the letters are on the glass and dry the frosting may be done, over the paper letters and all. Let this dry quite hard. Then dampen backs of letters with a sponge and remove same. This will leave the letter spaces clean-cut and shapely. Another plan is to cut a stencil of the letters out of thin cartridge paper, frost the glass all over and allow it to get nearly dry, then place the stencil on the frosting, secure it on all sides, then with a stencil brush rub out the frosting inside the letters through the openings of the stencil. You must be very careful, or the paper will break up the frosting. We prefer to use the outline method, it being in the end the quickest and surest.

**LAY-OUT OF ORNAMENTAL SIGN ON GLASS.**—Measure a sheet of paper to fit the size of the glass that is to be decorated and lettered,



fold the paper at its middle, making the crease sharp, then unfold the paper and lay it flat on the table. Now sketch in one-half of the design with charcoal crayon, working away from the creased part towards the opposite side. Then take another piece of paper, size of the half sheet that shows one-half the design, and rub it well with some dark, dry pigment, using a cloth to rub with. This works like a carbon paper. Place this last sheet of paper on the table with its colored face up. Fold the design in the middle, along the crease, with the half containing the sketch outwards, and lay it on the colored sheet. Now, with a hard lead pencil, trace the pattern on the face of the paper. Unfold the paper and look at it. It sometimes happens that while the first half looks well, yet when the whole appears it is not satisfactory. In such a case you may make any required alterations with the charcoal crayon, and try it over again. Then, if all is right, and you wish to preserve the design, trace it over with the lead pencil, doing both halves; then brush off the charcoal lines.

And now the lettering may be done. Snap a chalk line vertically through the middle of the design, on the outside of the glass, we assuming you are doing a window sign. Take a brush dipped in water and thoroughly wet the face side of the design, then place it accurately on the inside glass, being careful to get the center on the chalked line. Working from the center outwards, press out any air blisters or wrinkles, to do which it may be necessary sometimes to pull the paper from the glass, maybe half-way, in order to get it smoothed down. Go outside now, and neatly trace the entire design on the glass with a sharpened crayon, of chalk, but snapping the straight lines. The paper will remain wet for a long time, excepting in warm weather, when it will have to be dampened occasionally. The lettering may be done after the design has been placed. If more than one window is to be done with this design it may be removed from one window to another. When finally done with it the design may be dried and laid away for possible future use.

**THE CUT-IN LETTER.**—The board is painted whatever color the letters are to be, and when dry it is made ready for lettering by stencil work. The inscription is pricked out on manila paper and printed onto the board by pouncing. Then, instead of filling in the letters, the ground surrounding them is painted in. This is the quickest way of lettering signs of this grade; quicker and easier too for the learner. The

first of the illustrations shows the stencil work, with a line run at top and bottom, to define the same. This is the first move in the painting of the letters. The next figure shows the letters outlined, ready for the filling-in, which then appears in the next and last of the illustrations.

In doing cut-in work begin on the inside lines of the letter, as shown in annexed illustration.

**HOW TO HANG SIGNS.**—Some cities require signs to be made fast, so that no storm can possibly blow them down. All kinds of hanging signs must be hung with chains, and fastened with anchor bolts through the walls of the building. Wind or side bracing must be made with wire cables, fastened with bolts or lag screws. Single wire strands or screweyes are not allowed. Signs must not extend from the building line more than four feet, and there should be a clearance over the sidewalk of eight feet.

You should inspect the sign that you have hung, occasionally, to see if it is safely anchored. Since sign hangers began to use expansion bolts and other improvements in building and hanging signs accidents from improperly hung signs have grown very infrequent.

**BULLETIN SIGN PAINTING.**—The first requisite in good sign painting is a good brush, one that will cut a clean, smooth edge. A few camel hair brushes for fine lining and several chisel-edge fitches are sufficient on ordinary work. With a good outline of letters to begin with the work is two-thirds done, as most any one can run a brush along a line. There are several ways of getting an outline—by sketching, by measuring, etc., but the surest way is by means of patterns. A pattern that is cut true will give a true outline, and if the outline is followed closely with a brush the letter will be true. We don't mean stencils, but patterns cut from cardboard and showing the letter itself, and intended to be outlined by marking along the edges with a pencil.

**STENCILLING LETTERS ON SIGN.**—There are several kinds of stencils that may be used in lettering. We give herewith three different kinds. The first is that shown in the word "DECORATOR," marked No. 1. It is the straight-out stencil of the ordinary type. The lettering may be any ordinary bold style, drawn on stencil paper and cut out with a sharp knife, leaving ties where necessary, these being made to frankly cross the bar of the letter at right angles.

No. 2 is a background stencil. There the background of the letter is stencilled. To complete it, a straight line may be drawn either with a

fitch and straight edge, or a pencil at the top and bottom edges of the line of letters. In this way no ties are shown. A background stencil is generally only used when the stencil color is darker than the ground. No. 2 and No. 2b show the result obtained, first, by the stencil and, secondly, the same finished by filling in top and bottom margins.

1  
**DECORATOR**

2a  
**DECORATOR**  
2b  
**DECORATOR**

3  
**DECORATOR**

3a  
**DECORATOR**  
3b  
**DECORATOR**

If thought advisable, the pencil or fitch may be dispensed with, and a second stencil cut to fill in the top and bottom margins. The second stencil would take in the portions necessary to complete No. 2a and make it correspond with 2b.



A third type of stencil is one in which the letter is stencilled without ties. In this way No. 3 example is produced by the use of the two stencils marked No. 3a and No. 3b. One stencil plate is made to take the horizontal portions of letters and the other plate the uprights.

**QUICK GLASS SIGN WORK.**—If the sign is to be done in the shop, with large letters, and you wish to save the time that it would take to prepare a pounce or stencil pattern for the lay-out, mix up some whiting and water, with a little mucilage size, and apply this to the glass; when dry mark out the lettering; this will give you a lay-out that will be clearly visible from the other side. Some use dry white lead instead of whiting; in this case first dampen the lead with a little alcohol, then it will be easier to mix with the mucilage and water.

**MARBLE BACKGROUND ON GLASS OR WOOD.**—Have a pan that will take in a sheet of glass or wood of the size you require, pour into it about an inch or so of water, and then pour on to the water any oil colors that you wish, red, blue, etc., take a stick and stir around the oil colors, which will form them into curled shapes; then allow the water to become still. Now take the glass or board that you wish to marbleize and dip it carefully face down onto the surface of the water, then lift it out carefully, turn it over quickly and lay it down flat to dry. When it is nearly dry, with a dry brush blend the colors; if you wish, you can then dip the plate again, but not blend the colors.

In dipping glass some of the colors may run onto the other side, but this can easily be cleaned off. When you use a board the ground color should be painted first, but with glass the ground color is put on after the marbleizing is dry.

**TO ATTACH ALUMINUM-BACK LETTERS TO GLASS.**—These letters are ready prepared for attaching to glass, but require a size to hold them. The back of the letter is aluminum leaf, but the face is gold leaf with a black border. The best size for the purpose is Damar varnish, to which add a little white lead. After attaching the letters protect the edges of the black outlines with a pencilling brush dipped in spar varnish.

**TO MIX DRY LAMPBLACK WITH WATER COLOR.**—Vinegar is usually employed for the purpose. Some prefer a little soapy water, the alkali of the soap cutting the grease of the black, and vinegar, or any weak acid, will do the same.

**LETTERING ON WINDOW WITH BRONZE.**—Make a quick size of

japan gold size, a little medium chrome yellow, and some of the bronze powder. Mix together and add a little good rubbing varnish; it is ready. Apply and when tacky rub the bronze on with a velvet pad. Two or three colors of bronze may be put on a line of lettering, by having as many pads, one for each color, and doing a proportional part of the letter with each pad.

**PAINTING BOX TRANSPARENCY.**—Paint will not get into the substance of the glass, hence the paint will be affected by the heat and sometimes peel off. Plenty of ventilation is necessary to reduce the power of the heat. If the top and bottom of the box are made of screen cloth (wire) the trouble of peeling is greatly minimized. Then, the paint should not be made brittle, do not use too much driers in it.

**RAISED GOLD LETTER BOARD SIGN.**—With smalted background, is a very handsome sign, as is also the shaded gold letter with varnished background. But here is another attractive sign along the same lines. Mark out the letters a trifle larger than the letters are to be in the finish, then cut-in and sand the background with well sifted white sand. When dry dust off loose sand and apply two coats of flat lead paint, and a coat of thin shellac, then size entire surface with slow fat oil, and gild solid. Letter in glossy black, leaving burnished gold outline around each letter.

**MODERN WAY OF GILDING ON GLASS.**—In former years a strictly first-class gold-on-glass sign was made with a bright outline of gold, the center being stippled with Damar varnish, and then gilded with pale gold and water size. As the second gilding had to be backed-up and the surplus leaf cleaned off, as done with the first gilding, this made practically two gildings and letterings. The method now is speedier and produces just as good a job. The first gilding or outline is of deep bright gold, and when it is dry the surplus is wiped off with a damp wad of cotton; then the center is sized in. Slow size is preferred, as it makes the most durable job. When the size is right the pale gold is applied from the book, the same as on board signs. When this is burnished the letter is ready to outline or shade, without the second job of lettering or backing-up. This method does not give the stippled effect, yet it makes a rich, dead-gold center, which many think far more handsome.

There is also a one-gilding method that is used where the price does not warrant using two gildings. This is as follows: Outline the letter

in black (lampblack in japan) and either concave or center the letter with Damar varnish. When dry, gild with water size and back-up. When the backing is dry, clean off surplus gold and outline with some bright color.

**THE VARNISHED GROUND BOARD SIGN.**—Formerly, as a rule, the letter was sized on the board and a yellow high-light and color shade was considered necessary. The process to-day makes the letter as thin as possible, and to increase its bulk by putting heavy outlines away from the letter. These outlines are made either dark or light, as the background may require. This applies to the principal lines of lettering. The small lines are one-stroke and underscored, or shaded with a one-stroke shade.

**MAKING A FINE BULLETIN SIGN.**—Say our space is ten feet high by fifty feet long. Prime it with lead paint. Make this paint from 12 lbs. of white lead, thinned with a gallon of raw linseed oil and one gill of turpentine, with driers. When this coat is dry spot on the yellow where it is intended to cut-in the letters. Use medium chrome yellow. To the pound of yellow add a pint of linseed oil, one gill of japan, and one gill of good spar or clear coach varnish. When this is dry the head and base lines may be struck, or, if curved lines are desired, drawn and the letters outlined. The letters may now be cut-in with blue. To a pound of ultramarine blue add 6 lbs. of white lead and mix with one quart of turpentine. This makes a flat color for the background. To add to its attractiveness, it should have a 4, 5 or 6-inch border in a good permanent red. This red may be mixed with equal parts of raw linseed oil and coach or spar varnish, to give a suitable glossy finish.

**GILDING ON PAPER AND CALF-SKIN VELLUM.**—Letters or ornaments are gilded on vellum or paper in three ways. In the first way a little parchment or glue size is mixed with the ink and the letters, etc., are drawn as usual. When they are dry a slight degree of stickiness is produced by breathing on them. Then the gold leaf may be applied and gently though firmly pressed to make it adhere well. In the second method some white lead or chalk is ground with strong size, and with this the letters are made. When the size is almost dry the leaf is laid and then burnished.

The third way is mix some gold powder with size and form the letters with it, using a brush, as in the previous method. Parchment size is made by boiling down pieces of parchment or white leather until reduced to a stiff jelly. Glue should be broken into small bits, covered with



cold water and left stand until soft, when it may be boiled, after which it is to stand until jelled. Isinglass size also is used.

**GOLD LETTER SIGN IN 24 HOURS.**—Give the board a priming with thin shellac; in about fifteen minutes sandpaper it lightly, then another coat of the shellac. When dry, lay out the inscription, neat and with care; size with quick size; in an hour it should be ready for gilding. The black for cutting-in with is the usual kind, as described under the head of "The Gilded And Smalted Sign." Cut-in and fill with this black. Sift smalts on evenly, and use fine smalts. Shake off, paint the margin between the head and band, if any, and the bands of the sign, using quick-drying color, and it is done. The sign may be sent out the next day and hung. Perhaps it might be as well to hang the sign painter at the same time.

**SIZE FOR ALUMINUM LEAF.**—Thin up some good oak varnish with a few drops of turpentine, if the day is warm. If cool, add three parts of gold size japan to one part of copal varnish. Clean the pencil in turps now and then, which will enable you to get sharper edge on letters. If you have trouble with the leaf on a windy day, sew up, with large stitches, through three parts of two sides of the book with sewing cotton. As each leaf is required tear away the leaf of the book over the aluminum you want to use.

**LETTERING WHITE ON DARK GROUND.**—It will require two coats of white paint to cover well. When the job must be finished at once, make the first coat with white lead thinned with turpentine, with driers. The second coat make from white lead thinned with equal parts of varnish and raw oil, with a little turpentine; omit driers. Add a little Prussian blue to the second coat. To the first coat the addition of a little black will help the white cover the dark ground better. The paints should be strained through cheesecloth or old stocking. Zinc white ground in oil and thinned out with varnish three parts, raw oil one part, and a very little turpentine, for finish.

**BLACK SIZE FOR GOLD LETTERS.**—In an office building the gold lettering on the glass doors had to be done on black size. The reason for this is, a uniformity of all the signs in the building. It is made from japan lampblack mixed with quick-drying varnish, adding a little fat oil, which will give proper tack for the gold leaf after the black is dry.

**GOLD LETTERS WITH SILVER BACKING.**—This gilding is done with

"half gold leaf," one side gold, and one side silver. It is made especially for glass sign work, and is of course cheaper than all gold.

**WHITE LETTERS ON BACK OF GLASS.**—In white lettering on the back of glass, without a dark outline, it will give a much better job to apply two coats, the first rather thin, and the second quite heavy.

**POUNCING ON GLASS.**—The pounce is often used when gilding on glass. When this is done in the shop, on the table, there is no particular difficulty, but when it has to be done with the glass in position the pounce can be attached to the glass with gummed stickers.

**TO PREVENT SWEATING OF GLASS WHILE GILDING.**—It is claimed that the free application of grain alcohol to the glass will prevent sweating for at least ten hours, even in frosty weather, but there must be a fair degree of ventilation in the room. This will not apply, how-



HOW TO START CUTTING-IN LETTERS

ever, where there is a gas radiator or stove in the room in close touch with the glass.

Before applying the alcohol wipe off the glass and have it clean and dry.

**A NOVEL QUICK GOLD SIGN.**—The entire space that was to be used as a sign on a window was coated in black, mixed with japan and some quick varnish, just enough to bind the paint. When dry, the lettering was cut out with a sharp point, with a straight-edge to get true lines, then the letters were cut out with a sharp chisel, being careful to cut the edges true and smooth. The letters were then filled with gold leaf, silver or bronze. When dry, back up and varnish.

**LETTERING ON WIRE GAUZE.**—The wire should be painted with very finely ground pigment, as Venetian red and black for a brown, thinning with turpentine and adding enough varnish to bind the paint.

The paint should be made very thin. Then build up the letters to a solid face, by filling the wire screen with dry white lead ground in turpentine and thinned with japan gold size; use the paint thick, and fill up the letters solid and a little raised above the wire surface. Size with fat oil and gild in the usual manner. A good way for making the letters is by using cut-out letters, placing these on the inside, when the letters may be painted very rapidly.

**TIN FOIL SIGN.**—Tin foil is difficult to handle, the inexpert will discover. Lay the sheet on some smooth, hard material, glass or marble, or anything that will serve as well, and smooth out the wrinkles. Cut out the letters as they are to appear on the sign. Fasten the design on the outside of the window, and attach the foil letters on the inside. The best size for fastening the foil letters is varnish made thin with turpentine. Tin foil is heavier than gold or silver leaf, and hence must have a size that is strong enough to hold. Size the letters and lay them in place. Lay a piece of paper over the letter and rub carefully with a piece of soft cotton cloth. See that every part of the letter adheres to the glass. When dry, apply a coat of spar varnish to the backs of the letters, the varnish to extend a trifle beyond the letter. If the letters are placed on the outside, add a little white lead to the varnish size, which will make a cement proof against cold and moisture. As tin foil cannot be handled in the same way as gold leaf, the best and quickest way is to first take thin manila paper and, using the same size as that used for fastening the letters to the glass, give both foil and paper a coat and paste them together. Spread the sheets out to dry, with the paper side up, as the foil is not as likely to stick to the surface as the varnish-soaked paper. Be careful not to get any varnish on the face of the foil. After the sheets are dry lay out the sign and cut out the letters, using a sharp knife. Cut on a hard surface; glass is perhaps the best. The paper backing makes the letters easier to handle and place in position; you don't need to use oil paper, or to treat the paper in any way; soaking with varnish size is sufficient. The letters may be shaded in the usual manner; it will give the letters a very neat appearance to run a fine black line around the edges before shading.

Crumpled effect may be obtained by taking a leaf of tin foil and crumpling it into a ball, then straightening it out just enough to give it a uniform crinkle appearance. Cut out and attach the letters on the inside of the glass, as the crinkle catches dust on the outside.



There are several different ways of making these tin foil signs, on both wood and glass.

**ANOTHER NOVEL SIGN.**—A rather novel-looking sign is to paint the body of the sign on the outside of the glass, then on the inside take another color, and run a line around all the edges of each letter as broad as desired, or else miter the corners, or use a dark and light color for lining them. At a distance this gives the letter the appearance of being cut from wood and beveled on the edges. Letters may be painted on the outside and shaded on the inside, but when the face is in a light tint the shading should be very little darker next to the letter, and gradually blended out darker and darker until the outside of the shading is very dark. When the face is black or in dark tint, this process should be reversed. When the shading is on the inside, the effect is different than if on the same side as the face of the letters, which is on account of the light shining through the glass, and the colors must be arranged to give it the proper effect when viewed from the outside of the window.

**ARRANGING CURVED LINES OF LETTERS.**—When the sign painter has a wall space to letter and it will have some curved lines, he will sketch the curves without aid of line and chalk, but even he will sometimes find it necessary to use the latter helps in certain cases. Say it is a circular line at the top of a large wall or fence sign, he will fasten one end of the line at the bottom and with a piece of chalk and the other end of his line he will describe the desired curve. If space admitted and it was desired, he could make a circle in this manner, only he would have to take a position with his string's end at the center of the proposed circle. Then he meets with some problems sometimes in this sort of work. For instance, say he has a long, low wall or fence, and a curved line is to be made at the top of the space. With his line attached at the bottom he could only make the arc of a circle, not a true curved line. He might dig away some earth at the bottom of his wall, at its middle at the surface of the ground, and hold the end of his string down in the hole thus prepared. But what a crude way. A better way would be to first make a lay-out on paper, on a scale of one inch to the foot. Then draw foot units on the wall to represent the inch units on the paper. The curve on the paper is thus easily represented on the wall.

To form a circle for a sign, such circles usually being comparatively small at the largest, it is only necessary to have a large pair of wooden

dividers, with a sharp steel point on its ends, such being purchasable at painters' supplies shops, a piece of chalk being attached to one of the points if not desirable to scratch the sign space.

To divide a circle into equal portions, as it is sometimes necessary in laying out a sign, set the compass or dividers to half of the circle's radius; the straight line distance from one to another of six equally distant points around the circumference of the circle will be one-half the diameter.

**LAYING OUT A STAR.**—To make a star within a circle, first make the circle with the dividers, then measure off the circumference into five equal parts, making a dot at each point. For convenience in illustrating the process let us assume that the dots are marked A, B, C, D and E. Run a line from A to C, another to E, thence to B, thence to D, and finally to the starting point at A. To make a shaded or double star, run a line from the center of the circle to the middle point of each ray. Then paint on one side of each point, which will cause the star to seem as though standing out.

**TO MAKE A LARGE CIRCLE.**—This has been described but may be repeated. Drive a nail at the center of the proposed large circle, and attach a twine to it, taking the free end in hand and with a piece of chalk describe the circle. This is the method employed where large circles are required.

**TO GET A TRUE HORIZONTAL LINE.**—In the absence of a spirit level one may get a true level by the following method: Take a piece of twine and attach a weight to it, to form a plumb line. If you have a ready-made plumb line so much the better. Hold this plumb line where most suitable, say mid-way of your wall surface, and mark its position with chalk, making a true vertical line. Now form two circles on this line, just far enough apart to allow them to over-lap a little. Then place a straight-edge across the vertical line where the two circles meet and overlap, but exactly at the two points where the lines of the circles cross each other. Draw a line there, along the straight-edge, and you will have a true horizontal line.

**HOW TO MAKE AN ELLIPSE.**—The letters E and F represent the length of the ellipse, and D-G the breadth. With the dividers set at half the length, E-A, set them at D and mark the points C and B on the line E-F. These points C-B are the foci or focuses of the ellipse. Now insert a pin at C-B as shown, also one at D, then tie a string that will





















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